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# MONTANA STATE PLANNING BOARD

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## STAFF REPORT

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PERIOD ENDING DEC. 31, 1936

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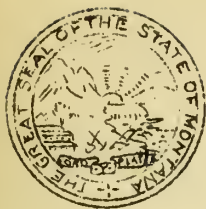


NATIONAL RESOURCES COMMITTEE  
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MONTANA STATE PLANNING BOARD  
AND  
ADVISORY PLANNING COUNCIL

STATE PLANNING CONSULTANT  
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION  
NATIONAL RESOURCES BOARD

HELENA, MONTANA.

December 31, 1936

Honorable D. P. Fabrick, Chairman  
Montana State Planning Board,  
Helena, Montana

Dear Sir:

I take pleasure in transmitting herewith the report of the staff of the Montana State Planning Board for the period ending December 31, 1936.

This report is made possible through the planning project sponsored jointly by the National Resources Committee, the Works Progress Administration and the Montana State Planning Board. The work was financed by the three sponsors with the major contribution provided by the Works Progress Administration.

The staff is further indebted to the technical agencies of the State and Federal Governments for factual information made available and the splendid cooperation which we have received from all these agencies.

Respectfully submitted,

*L. A. Campbell*

L. A. Campbell  
State Planning Consultant



IN CREATING THE MONTANA STATE PLANNING BOARD

THE MONTANA LEGISLATURE DECLARED - THAT-

"The public interest, welfare, convenience and necessity require the conservation and development of Montana's land, water, mineral, timber, coal, oil and other natural resources for the social and economic advancement of the people of the state in accordance with a comprehensive plan to be developed concurrently with regional and national plans now being formulated by national planning bodies in cooperation with the several states.

"The State Planning Board, hereinafter created, shall be regarded as performing a governmental function in meeting this necessity, whereby, through the exercise of foresight, use of scientific knowledge and harmonizing all of the interests of the state, assistance may be given in solving the complex problems of Montana, thereby effecting more immediate stabilization of the agricultural, livestock, mining and other industries of the state and bringing about more efficient, economic and fuller use of the manifold resources of Montana.

"The State Planning Board shall be regarded as an agency for encouraging the formation and activity of local and district planning bodies in the state, whereby, the people of the several municipalities, communities, counties or regions may assume the responsibility of developing plans and policies in cooperation with the State Planning Board, which Board shall also be regarded as an agency to assist in putting all such plans and policies into actual operation."

In this declaration the Legislature presented the reasons for planning in Montana and at the same time placed broad responsibilities upon the Planning Board.



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## PLANNING IN MONTANA

The Montana State Planning Board has believed that its function is to be the official agency of the State to advise with and express the views of the people of Montana on the conservation, development and beneficial use of our natural resources so as to bring about the greatest possible benefit to the largest number of our citizens.

The field of planning is broad and there is always the danger of attempting too many activities without definite accomplishment. The board has therefore instructed the staff to confine its efforts to the study of immediate, pressing problems in the endeavor to determine what can be done about them.

The logical and practical procedure is to make recommendations only after investigating the conditions and after full discussion of each problem with the people interested. The economic security and prosperity of the people has, at all times, been a first consideration.

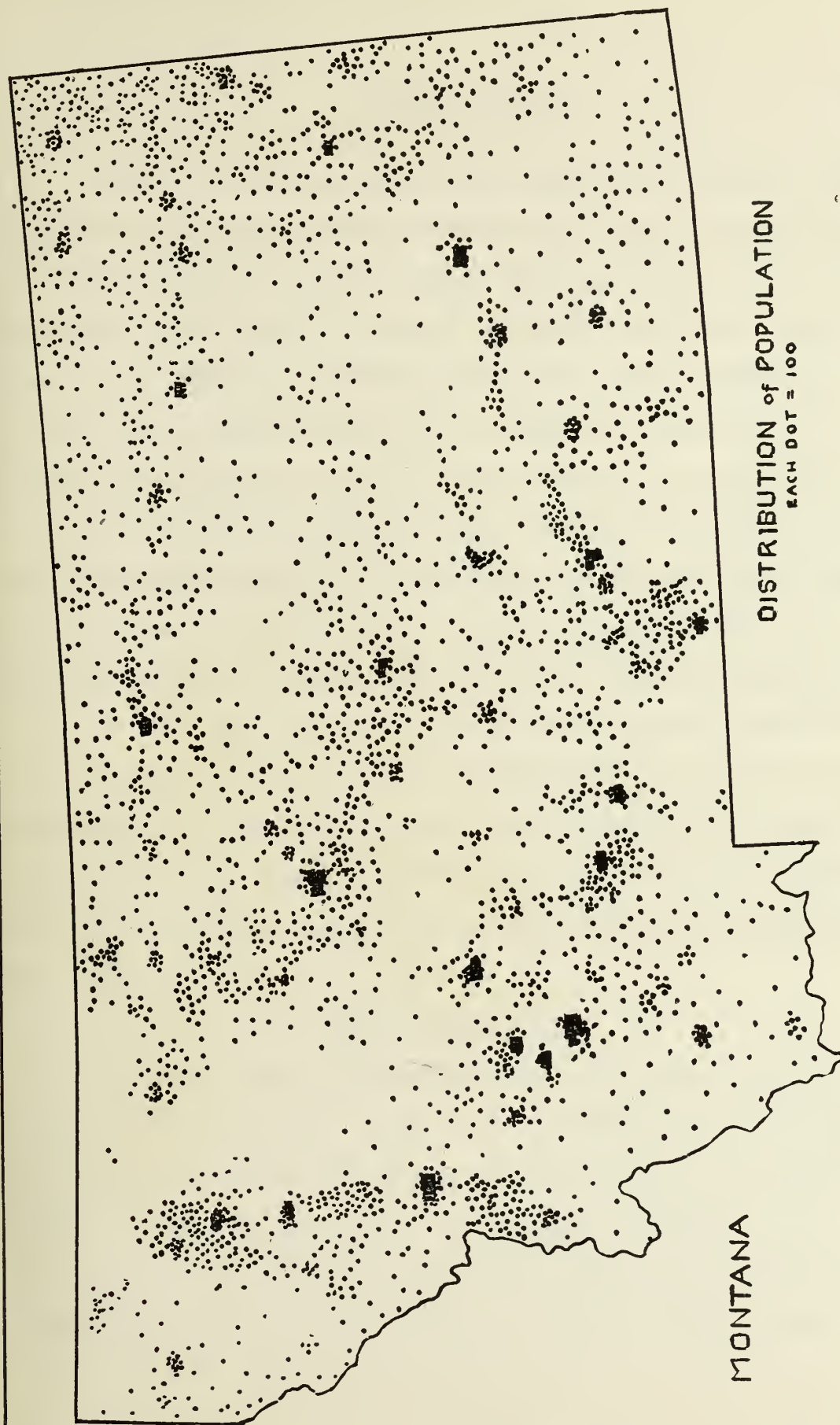
It is becoming increasingly evident that Montana cannot stand alone in determining what we as a state should do. In the conservation and development of our resources, we are partly dependent upon what is done in other states and in the nation as a whole. The staff has, therefore, reviewed the reports and recommendations of the regional planning organizations, the reports of other states and those of the National Resources Committee at considerable length.

Planning can never become fixed. It must be flexible enough to provide for changing conditions, but we have endeavored to keep in mind those fundamental principles and conservation measures that are basic to the future growth and stability of Montana.

In this report we present the problems which have had immediate attention together with the possible solutions. We present also, a digest of the information which has been collected covering the resources of the state. Additional detailed information is on file.

## THE IMMEDIATE PROBLEMS OF MONTANA

1. Many rural and urban families are at present without opportunities for adequate self-support.
2. We do not have sufficient irrigation, yet at the same time our flood waters are being wasted.
3. We do not have adequate winter feed supplies for our range livestock.
4. Stream control measures now under construction or proposed for construction on the Lower Missouri and Lower Columbia Rivers will create demands for the use of water which may prejudice the prior use of that water in Montana.
5. There has been a depletion of our range and the carrying capacity has not been maintained.
6. Our forest areas are not adequately protected.
7. We have no state policy that will assure sustained utilization of our forest areas.
8. Many small mining districts need better roads and are not readily accessible.
9. We have no program for preserving and developing our recreational resources.
10. Our people have not yet agreed among themselves to what extent we should go in the conservation of wild life.
11. We do not have wide distribution of electric power in rural areas.



MONTANA

DISTRIBUTION of POPULATION  
EACH DOT = 100

MONTANA STATE PLANNING BOARD



### STRANDED FAMILIES

Federal, state and private relief agencies have expended upwards of \$20,000,000 in the dry land areas of Montana since 1917. This has been in the form of seed and feed loans, direct relief and work relief. We are unable to determine the exact amount, but we know it exceeds that figure. Additional expenditures for the purchase of livestock, losses due to debt reductions, bankruptcies and other causes, add many millions more that must be charged to an attempt to establish agricultural practices that were not adapted to a semi-arid country.

Many families have moved to other locations, but even so 5,000 to 12,000 farm families have been receiving some form of relief during half of the time for the past 20 years. It is estimated that Montana has at least 7,000 farm families that cannot be self-supporting under their present conditions.

In our urban centers are many additional families, formerly employed in the coal mines, metal mines or in the lumber industry, who have not had adequate employment for at least six years. With an improvement in general business and agricultural conditions, a majority of these people will be re-employed. There are an undetermined number, however, who will need new opportunities for making a living.

### WASTE OF FLOOD WATERS

In Montana there are approximately 2,500,000 acres classified as irrigated or under the ditch. Actually about 1,600,000 acres are being irrigated. Most of the land now being irrigated together with all of the balance which is classified as under the ditch, has an inadequate water supply.

In most of the major drainage basins of the state, there is ample run-off to provide adequate water supply for lands capable of being irrigated at reasonable

cost. From fifty to seventy per cent of the annual run-off occurs during the months of May, June and July. Without storage only about ten per cent of the total flow is available for late season irrigation.

#### WINTER FEED FOR RANGE STOCK

Montana has never produced a sufficient, dependable and properly distributed supply of winter feed to provide for the livestock of this state. It is true that many of the older irrigated sections have an occasional surplus over local demands, but many sections, because of insufficient irrigation, have an acute shortage even in favorable years.

#### DOWN STREAM DEMANDS FOR MONTANA WATER

In a democratic form of government the needs of the larger centers of population generally dominate national policies. Proposals for large power and navigation developments on the Lower Columbia and the Lower Missouri, together with accompanying proposals for the creation of regional authorities or regional power agencies, have, therefore, presented many serious questions relating to the preferential use of water and the need for concurrent up-stream construction, both of which are important to the future development of this state.

#### RANGE USE

Indiscriminate use of the range areas of the state, has made it impossible for stockmen to carry out good range management practices. There have also been ten million acres of range destroyed by plowing, of which large areas have been abandoned. In many other areas our range has been seriously depleted.

N.B:--The 1930 Census shows 11,400,000 acres of crop land in the state and in addition 4,700,000 acres of plowable pasture, some of which is irrigated. As the total irrigated land is less than 1,700,000 acres and it appears to be the general opinion that 6,000,000 acres is the maximum limit of the profitable dry farming area, this leaves about

4,000,000 acres of crop land which should revert to range. In addition there is 4,000,000 to 5,000,000 acres which have been plowed at one time or another for cropping and later abandoned.

#### FOREST PROTECTION

Under Montana conditions, at least seventy-five years is required for a tree to grow to marketable size. We are experiencing tremendous losses annually in the forest areas of the state due to forest fires, insect damage and spread of disease. The U. S. Forest Service, State of Montana, and private timber owners have organized protective associations to fight these annual losses. They are inadequately financed. In consequence we are losing millions of dollars annually in the destruction of one of our most enduring resources. We are also suffering run-off losses due to the depletion of the natural cover of these water sheds, which otherwise would hold back the water and thereby help to maintain late season flow in our streams.

#### SUSTAINED YIELD

Private timber owners are not now encouraged to harvest their commercial timber by a thinning out process which would leave the smaller growth standing and thereby establish a sustained yield and an annual timber harvest. Under present laws we cut practically everything and burn that which is not salable, thereby denuding the areas and not perpetuating this resource.

#### SMALL MINING DISTRICTS

Montana has more than 100 well defined mineral districts that are not accessible because of lack of all year roads. Most of these areas are in the national forests. The present federal policy is to build roads and trails for fire protection, recreation and the general purposes of forest management. We have no

fixed national or state procedure for the construction or improvement of roads to these small mining districts so as to make them accessible for development.

### RECREATIONAL AREAS

Two thirds of eastern Montana lacks adequate recreational areas for the enjoyment of the people or to encourage the tourist to spend more time in that portion of the state. We do not have adequate legislation nor any program for the acquisition of land for state park purposes. We have no state agency to cooperate with the federal government in a program of park development. We have made no provision for the purchase of small strips of land along our highways and around our larger lakes to preserve their scenic and recreational values. We make no provision for the development of road-side camps to accommodate the traveling public. With the exception of the U. S. Forest Service, we have no program for the development of picnic grounds or recreational camps. We are not preserving our historical land marks and moun~~u~~ments. In other words, we have no recreational program and are not capitalizing upon one of our greatest resources.

### WILD LIFE

We do not have a balanced supply of birds, big game and fish throughout the state. Western Montana has good forest cover and a multitude of streams. It is highly favored in comparison with the eastern portion of the state. The lack of sufficient water in the streams of eastern Montana is a serious handicap to the propagation of fish life. The extraordinary demands on the range, together with insect depredation and a lack of cover, constitute a difficult problem in the propagation and maintenance of wild game.

### RURAL ELECTRIFICATION

In Montana only six per cent of the rural population enjoys the advantages of electric power on the farms. The situation is being partly corrected by federal rural electrification loans. We need, through irrigation, to create opportunities for closer settlement which will make it possible for more farm communities to enjoy the use of electric power which is now essential to any modern community.

### OTHER MONTANA PROBLEMS

The staff has largely confined its studies and activities to problems relating to the use of natural resources. There are other issues of importance including taxation, education, transportation, social welfare, etc., which have been recognized but on which investigations have not been made. These are under consideration by other agencies of the state.

# THE COMPLETION

## NATIONAL RESOURCES COMMITTEE

### REGIONAL PLANNING COMMISSIONS

#### MONTANA STATE PLANNING BOARD

Technical Advisors for each of  
the fields of State Planning.

STATE ADVISORY : PLANNING COUNCIL  
12 District Advisors  
State Works Progress Administrator  
State Engineer for Public Works

#### DISTRICTS

No.1.	No.2.	No.3.	No.4.	No.5.	No.6.	No.7.	No.8.	No.9.	No.10.	No.11.	No.12.
Counties: Lincoln Flathead	Counties: Glacier Toole Liberty Hill Blaine Phillips	Counties: Valley Daniels Sheridan Roosevelt	Counties: McCone Richland Dawson Prairie Vibaux	Counties: Fergus Petroleum Judith- Basin Cheatland	Counties: Cascade Chouteau Pondera Teton	Counties: Lewis & Clark Jefferson Broad- water	Counties: Sanders Mineral Ravalli Missoula Lake	Counties: Deer Lodge Silver Bow Madison Beaver Lead Granite Powell	Counties: Meagher Gallatin Park Sweet Grass	Counties: Golden Valley Russell Shell Still water Carbon Yellow- stone Treasure Big Horn	Counties: Garfield Rosebud Custer Fallon Powder River Carter

#### District : Advisors

#### Planning Committees

Area : County City

## ORGANIZATION OF THE STATE FOR PLANNING

At the state-wide planning conference held in Helena, March 26 to 28th inclusive, 1934, plans for the organization of the state, together with policies to be followed in planning, were recommended to the State Planning Board and later approved by them.

### The Organization

The Conference recommended the creation of an organization along the lines of the flow sheet on the opposite page. The state was divided into twelve districts with a District Advisor in each, chosen by the Conference. It was recommended that County Committees or County Planning Boards be organized in each county and that the organization of these Boards be under the direction of the District Advisors. The plan of organization to be based upon local conditions in each county.

It was further agreed that the State Planning Board should act as the agency to give official status to this organization to express the views of the state on questions of policy; and to assist in putting into execution the various plans or policies either local, district or state-wide as they were developed. It was also recommended that Montana maintain official representation on any regional planning commissions created by the National Resources Committee.

By that plan of organization it was believed that the people in the various counties of the state, working as groups, would be able to develop their local rehabilitation plans and harmonize them with district, state, regional and national policies. This would also give the National Resources Committee of the federal government the necessary contacts with the people.

A fundamental reason for this type of organization, repeatedly expressed at the conference and unanimously agreed upon, was that planning should originate with the people who are most familiar with the problems involved and best able to make recommendations for their solution.

#### Technical Committee

It was further recognized that if planning were to be on a sound and practical basis the various planning groups should have the benefit of all available information concerning the resources of their communities and the state, and that they should further have the benefit of technical advice provided by such technical agencies as the state could offer.

For these two purposes the following agencies were appointed by the Governor as technical advisors to the Planning organization.

Bureau of Reclamation  
U. S. Forest Service  
Montana Fish & Game Commission  
U. S. Geological Survey  
State Forester  
State Highway Engineer  
U. S. Corps of Army Engineers  
Superintendent of State Banking Department  
Chairman of Public Service Commission  
Commissioner of Agriculture  
Secretary of State Board of Health  
President of State University  
President of School of Mines  
President of State College  
Superintendent of Public Instruction  
Chairman of State Board of Equalization  
Register of State Lands  
Secretary of Livestock Sanitary Board.

#### Operating Experience

Experience has shown that Montana's plan of organization is practical. It's very strength is in its weakness. The organization has no control over the development and use of the state's resources. It has no control over the activities of executive agencies of local, state and federal governments. It has no control over established research which is highly technical and requires trained men. It does however, give the people free opportunity

opportunity for the expression of their opinions and offers a forum for discussion whereby these opinion gradually clarify into sound policies.

In every district there have developed sound programs for the conservation and beneficial use of the resources of the community, out of which have resulted much in the way of actual accomplishment. The work of the planning organization of the state in helping to formulate the water conservation and range improvement programs by bringing about a better understanding of what should and could be done, has resulted in concentrating the major activities of the WPA, Soil Conservation Service, Resettlement Administration, PWA and other agencies on these programs. It also resulted in unanimous support to the State Water Conservation Board at the last session of the Legislature which has since made possible a four million dollar construction program of larger projects, now under way.

It has further given the Planning Board confidence that on the questions of national policy with which it has been confronted during the past two years it has expressed sound views which have the support of the people.

#### Assisting Agencies

The Board is assisted through the assignment to the state of a Planning Consultant whose services are provided by the National Resources Committee. In addition to acting as a contact man between the Committee and the State Planning Board, his services have been valuable to the Board in the preparation of necessary reports and in a general advisory capacity. Various emergency agencies of the federal government have furnished assistance in the collection of necessary information and in the preparation of reports. During the past year, through a joint project sponsored by the National Resources Committee, the WPA and the State Planning Board, a planning staff has been available.

The members of this staff are mostly part-time employees working under the established rules and regulations of the WPA.

The purpose of this project has been to furnish useful employment to needy people. The project had to be fitted to their experience and training, but at the same time it made possible the collection of information which is useful in meeting the planning needs of Montana.

District Advisors have thus been supplied with stenographic, engineering and drafting help in working out the planning programs for their respective districts. A staff of engineers, draftsmen and stenographers has been maintained at Missoula, Butte, Bozeman and Helena. The work at Missoula has been carried on in cooperation with the State University, State Forester and U. S. Forest Service on forest and recreational problems. The work at Butte, in cooperation with the School of Mines, has been to prepare a directory of mining operators to investigate the underground water resources and to summarize the available information on the mineral resources of the state. The work at Bozeman, in cooperation with the Montana State College and Resettlement Administration, is to bring together information on land and water use problems. The staff at Helena has been used to coordinate and study the reports from these various district offices and state and federal agencies as well as to carry on certain other studies for the Board.

The Planning Board has its own staff consisting of an Assistant Secretary, Project Secretary and one stenographer, the latter furnished to the consultant in accordance with our agreement with the National Resources Committee.

The Helena staff also cooperates with federal and state agencies whose headquarters are located at Helena, in gathering essential information, preparation of maps, etc.

### Montana Committee

It was early discovered that in a consideration of Montana's problems, it was necessary to set up state committees, the chairman of which represent Montana on similar regional committees. These committees are not continuously active but function from time to time as the need arises.

One committee, the need for which was very great, was the Committee on Economic Development for Montana. The membership of this committee includes representatives of the following:

- State Water Conservation Board
- Works Progress Administration
- Public Works Administration
- Montana Highway Commission
- The Resettlement Administration
- Montana State College
- Montana Grazing Commission
- National Emergency Council
- U. S. Forest Service
- State Board of Health
- Montana State Planning Board
- U. S. Bureau of Reclamation
- Montana Fish & Game Commission
- Soil Conservation Service

Its purpose is to coordinate the work of the various federal and state agencies into a state-wide program so that the efforts of all would be of greatest service to the communities of Montana.

The committee held most of its meetings in the various counties of the state. In that way they were able to meet with county planning boards and other interested groups for round table discussion of the problems of each particular county. As a result of such discussions the work of these agencies is gradually being more and more adjusted to local conditions, thus assuring results of more practical value.

### Technical Advisors

The activities of the Board and cooperative planning groups, have been given a great deal of prominence and recognition, but little has been

said about the work of the technical advisors to our planning organization. Montana has an exceptionally high-class personnel of technical men working unheralded in our state educational institutions, in our state departments and in the departments of the federal government. These men do research work and are constantly developing information that is essential to intelligent and successful planning. They have gathered information about our soils, about the crops adapted to agriculture, the economic use of water, our surface and underground water supplies, our climate, our mineral production, our mineral resources, our forests, our power resources, our wildlife, our recreational areas, etc. They study disease of our plants, our livestock and our people. They study our tax problems, our welfare and our social problems. Through engineering, chemistry and the other sciences, they teach us new methods of using our resources and new ways of living.

Much of the information upon which the Board has endeavored to develop a state program, is the production of these men. Without that information planning would be ineffectual and aimless. The planning organization is an agency which can make valuable use of that information in a manner to be of value to the people of the state.

The need for correct county maps on a uniform scale was met by the Highway Planning Survey which furnished copies of their new maps of each county. These have been of great assistance in mapping county resources.

## STUDIES AND RECOMMENDATIONS

1. Public Works Inventories
2. Studies of proposed regional authorities
3. The Nation-wide drainage basin survey
4. Recommendations to the President's Drought Committee
5. Study of state revenues and expenditures
6. Study of water-right laws
7. Inventory of the state's resources.

## PUBLIC WORKS INVENTORIES

State public works inventories are of particular value during periods of unemployment when large emergency expenditures of public funds are being made to relieve distress through employment.

They are also valuable in the preparation of a long-time public works program, fully engineered and ready for construction, which may be expanded or contracted from time to time as future needs for unemployment relief may occur.

Finally these inventories afford an opportunity for a study of the various types of projects, their comparative costs and man hours of employment provided, and the respective value of each to the community or the state. They offer opportunities for establishing priority of projects which will contribute to the conservation of our natural resources, thus bringing about the readjustments needed for agricultural stabilization and the permanent security of the people.

If the Federal Government and the several states had been prepared with a carefully planned program of public works five years ago, we would have secured much greater benefits from the emergency funds which have been spent.

In announcing the first public works program the President stated that he would like to have the money allotted to projects which furnish a high percent of employment to common labor and which contribute to the permanent rehabilitation of the country and the people. This cannot be done without planning to meet these requirements.

The first public works inventory in Montana was undertaken in the early winter of 1935. It was conducted jointly by the Planning Board and the Public Works Administration. In this work the board had the full cooperation of the Water Conservation Board, the Highway Commission, the Montana Relief Commission, the State Board of Education, county and local planning

bodies, county commissioners, city officials, chambers of commerce and many other agencies both federal and state.

One thousand nine hundred and one proposed projects for public works or work relief were reviewed and rated according to their need or suitability. These projects involved a total expenditure of more than \$273,000,000. From these proposals a digest was prepared of the available and more suitable projects. It was found that these would furnish a total of nearly 3,000,000 man days of work at a cost of \$34,000,000. About 800 additional projects that could not qualify for repayment, were classified and summarized in a report which was submitted to the F. E. R. A. These latter formed the basis for much of their work which has been expanded by the WPA and other emergency relief agencies.

A second inventory is now in process. It is confined to projects that are either ready for construction or which the various public agencies of the state contemplate undertaking within the near future.

#### THE PROPOSED REGIONAL AUTHORITIES

There have been pending in Congress certain acts for the creation of Regional Authorities or Regional Power Agencies.

One known as the "Pope Bill" introduced by Senator Pope of Idaho, proposed to create a Columbia Valley Authority. The second known as the "Norris Bill" introduced by Senator Norris of Nebraska, proposed to create a Mississippi Valley Authority. The proposal to create a regional power agency in the Pacific Northwest was never introduced, but a bill known as the "Bonneville Power Bill" was under consideration by Congress last winter. This act provided for the sale of power from generating plants to be installed at the Bonneville Dam and established federal policies relating to the sale of power from all federal projects.

"The Pope Bill" would create a commission of three men, to be

appointed by the President of the United States, with broad powers of control over the future development and use of the resources of the entire Columbia River Basin including all tributaries.

This commission would be authorized to buy or lease real and personal property; to exercise the power of eminent domain; to build and operate dams, reservoirs, power units, transmission lines, navigation projects and incidental works in the Columbia Basin; to take over the Bonneville and Grand Coulee projects after their completion; and to issue \$50,000,000 in government bonds for construction work. It would be the duty of the commission to bring about maximum irrigation, flood control, navigation and power development in the Columbia Basin; to bring about the proper use of sub-marginal lands and sound methods of reforestation of lands and to advance the economic and social well being of the people.

The "Norris Bill" would create a similar authority for the Mississippi Valley which is defined as all of that section of the United States the waters of which, if undiverted, ultimately flow into the Mississippi River, thus including the streams of eastern Montana. The Ohio River and Valley were the only exceptions.

There are a few differences between the provisions of these two bills. The principal one, as it affects Montana, was the provision that the Mississippi Commission is directed in the operation of any dam or reservoir in its possession and control, to regulate the stream flow primarily for the purposes of promoting navigation and controlling floods.

#### Montana's Objections

The fact that the use of water for navigation, or the control of water for the prevention of flood damage, is thus made superior to the use of water for irrigation in the Mississippi River Basin, was considered detrimental to the best interests of Montana.

The powers and duties of these two commissions were so broad as to give them virtual control over the land, water and timber resources of the

two regions. Furthermore the authority to develop, transmit and sell power, gives broad control over the future location of industrial plants, thereby directing future industrial development within the region.

The Board therefore, questioned the desirability of creating such authorities. Wide discussion of the numerous issues involved were held throughout the state and the people contacted were practically unanimous in sustaining the position of the board.

This position was also concurred in by the Pacific Northwest Regional Planning Commission. Nor have the states to the east of Montana, expressed themselves as favorable to the creation of regional authorities.

#### Montana's Recommendation

There arose, however, the question as to how these regions might best be organized for the planning, construction and operation of public works projects, particularly in connection with the regulation and beneficial use of the available water supplies.

After canvassing the views of the state the board recommended -

1. The continuation of regional planning commissions on which each state has equal representation, and with a chairman appointed by the National Resources Committee.
2. Construction of federal projects by existing agencies. They have experienced and qualified personnel to carry on any work which may be undertaken.
3. That generally speaking, the operation of the projects should be continued in the hands of the agency that does the construction work.

This position was also finally concurred in by the Pacific Northwest Regional Planning Commission except in the operation of power projects.

#### Columbia Basin Study

In connection with these various problems a study was finally requested by the President, of the entire Columbia Basin Region. The study was conducted by the Pacific Northwest Regional Planning Commission in cooperation with the planning boards of the member states. It included studies of the resources, transportation, power development and use, irrigation, recreation

agricultural and forestry problems, future industrial development possibilities, population growth, regional planning and suitable organization for carrying out a long-time rehabilitation and development program for the region. In other words, it was an exhaustive study of the resources and problems of the region.

#### Regional Power Agency

The recommendations finally presented in this report were unanimously concurred in by the member states with the exception of the proposal for the creation of a Regional Power Agency to handle the development, sale and transmission of all power from federally operated projects in the Columbia Basin.

The Montana Board voted favorably on the intent of this recommendation, but reserved the right to review any legislation incident thereto, before placing the state definitely on record as endorsing it.

The reasons for this are two-fold. The first is the uncertainty that exists as to the policies of the federal government relating to the preferential use of water for various purposes. It is true that Montana has an apparent surplus of water west of the Continental Divide. But most of this water flows during the early part of the summer and without storage there is an actual shortage during the late irrigation season.

Power development on the lower Columbia requires the holding of the run-off water during the summer to be released during the winter when the stream flow is at its minimum. Irrigation requires the release of stored water during the late summer. The use of the water for these two purposes is therefore in conflict.

Furthermore, any policy adopted in the Columbia Basin establishes a precedent for the Missouri River Basin where Montana does not have a surplus of water that cannot be put to beneficial use.

The second reason is due to a state law which prohibits an official of the state from encouraging the use, outside of the state, of the

waters of Montana without the consent of the legislature.

### Final Recommendations

The board finally adopted the following statement relative to these several proposals. This statement was later approved with some modification by both the Pacific Northwest and the Central Northwest Regional Planning Commissions.

"In the creation of any regional agencies or authorities by the Congress for the regulation, control and development of drainage basins located wholly or partly within semi-arid regions, the following four fundamental principles should be established as national policy:

1. The use of water for domestic and irrigation purposes is superior to all other uses.
2. The prior right to the beneficial use of water as near the source as is feasible is a necessary protection to the semi-arid headwater regions.
3. Control measures upstream should be given prior consideration as to time of construction.
4. A majority membership of the controlling board, or boards, should be made up of qualified citizens of the region who have an intimate knowledge of the problems involved.

"The use of water for irrigation and other purposes near the source, regulates and stabilizes stream flow for the entire river system and becomes an aid therefore to flood control, power development and navigation all the way down the stream.

"On the other hand, full prior development of control measures downstream has no beneficial value upstream, and may place such demands upon the headwaters as to interfere with their development at a later time. For the best interests of the entire river basin therefore, and to guard against possible interference with the natural opportunities for the use of water near the source and the resulting impoverishment of the headwater regions, it is necessary that these principles be given recognition.

"Mandatory provisions for their recognition and observance should be incorporated in any acts creating regional agencies or authorities."

The board was represented at the special hearing of the sub-committee on Agriculture of the United States Senate by the state consultant at the time these various proposals were under consideration. Montana's views were presented substantially as above outlined supplemented by the following recommendation.

"It would seem desirable that before any permanent regional agencies are authorized by the Congress, either restricted in their duties to the sale of power or with broader responsibilities, that provision be made for the states at interest to enter into compacts for the allocation of the waters of these streams, which when ratified by the various legislatures, will eliminate the danger of long drawn out legal disputes that might otherwise arise."

#### The Bonneville Power Act

The "Bonneville Power Bill" did not appear to affect Montana particularly at this time since power can be produced in this state more cheaply than it can be transmitted from points of production farther down on the Columbia River. However, there were two provisions in the bill which the board considered should be revised.

One authorized the profits from the sale of power from the Bonneville plant to be distributed.  $37\frac{1}{2}$  percent to the state of Washington and  $37\frac{1}{2}$  percent to the state of Oregon. Since 41.8 percent of the water flowing over the Bonneville dam originates in Idaho and Montana this did not seem to be a fair provision. It is however difficult to apportion these profits equitably among the states and therefore Montana recommended that the profits, if any, should be used for the further development of the region. This was concurred in by the Regional Planning Commission with the added recommendation that the profits might otherwise be used to bring about a reduction in the rates.

The other provision was to establish a new federal power policy which would repeal the Act of 1924 under which the Bureau of Reclamation now

operates in the sale of power developed incidental to irrigation works. In view of Montana's superior interest in irrigation, the board believed that no new federal power policy should be adopted which would be prejudicial to the further development of irrigation by making it impossible to charge off a proportionate share of construction costs to power revenues on multiple purpose projects.

#### THE NATION-WIDE DRAINAGE BASIN SURVEY

The board cooperated with the National Resources Committee and the Pacific Northwest Regional Planning Commission in a nation-wide drainage basin survey the purpose of which was to develop a long-time program of water conservation and to discover those projects which are ready for construction as a part of a six year program of public works.

This survey was requested by the President and the National Resources Committee, through cooperation with the WPA, provided a technician to assist the board in making its report for the state.

For the purposes of the report Montana was divided into five drainage areas, the Kootenai, the Clark Fork, the Missouri, the Yellowstone and the Little Missouri.

The information included in these reports was quite detailed. It covered a general description of each basin; population; a description of the larger towns and cities; the principal industries; the acreage in irrigated land, dry land, range and forest; history of the present development; the major streams and their tributaries; water supplies; extent and adequacy of present water development; underground water supplies; stream pollution, flood prevention problems etc. For each basin there was presented a summary of deficiencies and future needs in the use of water and a comprehensive plan for the development of the area.

Appended to the report was a detailed statement on all proposed

water conservation projects, classified into three groups. The first group included those projects which are ready for immediate construction. The second, those on which additional engineering is needed, and the third, those that are physically feasible but not recommended for construction under present conditions. A total of 77 projects was reported on for the state, involving an estimated construction cost of \$55,809,715.

These state reports have since been combined into regional drainage basin reports and submitted to the President during December of this year.

Some discussion arose over the status of the Grand Coulee project in relation to the development of the Columbia Basin. The board stated the views of Montana as follows:

1. It has been stated that one of the primary needs is to develop new irrigated areas.

We agree that additional irrigation development is needed. This can be met in the shortest time by providing dependable all season water supplies for existing irrigated lands and the extension of present irrigation systems.

This policy will not permanently and fully meet the needs for additional irrigated lands. Therefore, the next step is the development of new areas for which a dependable water supply can be provided at a reasonable cost.

2. It has been argued that the Grand Coulee Project is considered to be the most important single project within the region.

This is not the viewpoint of Montana. Without minimizing the importance of Grand Coulee, we wish to point out that, to the extent that the power and irrigation development is immediately justified, this can be brought about at a much smaller cost and more quickly through provision for supplemental water supply. This policy will correct an uncertain agricultural situation in most of the present irrigated areas, and will give a wider distribution of the benefits.

3. It has been further argued that the concurrent development of supplemental water supply and of smaller irrigated areas throughout the region, need not be hampered by large appropriations for Grand Coulee.

The fact that this statement is made, is an admission of the danger that appropriations for these smaller projects may actually be deferred if large allocations are made for Grand Coulee.

The importance of concurrent construction for supplemental water supplies and for smaller irrigated areas throughout the four states of the region should, therefore, again be stressed as being of superior importance in meeting an immediate need.

In other words, planning to anticipate a future need should not overshadow planning to meet an immediate problem.

#### The Grand Coulee Project

In order that there may be no misunderstanding, Montana now desires to restate its position with respect to Grand Coulee.

This is a large project requiring several years of construction work before it can be brought to the point where irrigated land will be available. Even with other possible irrigation development within the region, there will still be need for the lands to be irrigated at Grand Coulee. The arguments in support of that statement have been presented before and we concur. It is, therefore, necessary to continue the development at Grand Coulee in order to be prepared to meet a growing demand for new irrigated lands that cannot otherwise be met.

In order that there shall be an orderly and progressive development of the entire region, it is obvious, however, that concurrent with future allocation of funds for construction work at Grand Coulee, there must be necessary appropriations made available for the development of supplemental water supply for existing irrigated areas, for the delivery of water to existing communities now farming unsuccessfully without irrigation and for the development of other irrigated areas on a smaller scale for which a dependable water supply can be provided at a reasonable cost.

Montana believes such a policy is sound for the region as a whole and that it makes possible greater accomplishment at a smaller cost in a

shorter time.

## THE REPORT TO THE PRESIDENT'S DROUTH COMMITTEE

Members of the Central Northwest Regional Planning Commission, meeting in St. Paul during the summer of 1936, urged the importance of public hearings to be held in the drouth area as a basis for further consideration of a long-time program of rehabilitation of the Northern Great Plains region.

The first hearing in the region, of the President's Drouth Committee, was held at Rapid City, South Dakota in August. At that meeting representatives from seven states presented reports from their planning boards, together with a joint regional report.

The regional report which expressed the views of all the states emphasized the following broad policies:

1. Land Classification For Use: In order that the misuse of lands may be modified and prevented from recurring, immediate steps should be taken to classify all lands, both publicly and privately owned to determine their most effective use.

As a result of this classification, zoning of lands in some states may be indicated and authorities to do this will be necessary. Continued land purchase may also be necessary and a policy of administering purchased lands will be needed.

2. Factual Basis For Planning: As a full factual basis is necessary for all planning activities, all technical information should be coordinated and added to.

3. Land Ownership: As land tenancy and short tenures make soil conservation difficult, consideration should be given to measures intended to increase the proportion of land operated by owners.

4. Water Resources and Soil Cover: The water resources of the region should be developed, conserved and protected from pollution. This in-

cludes the development and protection of the natural soil cover, namely grass and trees.

There is need for legislation to control and develop ground-water resources.

Surface-water supplies should be conserved through the construction of large works to serve large areas and provide a large outlet for labor.

Ponds and reservoirs to serve individual farms, groups of farms and ranches are also needed.

5. Farm Forestry: A comprehensive and unified plan for Farm Forestry should be initiated.

6. Insect And Pest Control: Effective financial support to federal agencies is needed to insure constant annual measures for insect and pest control with adequate supplies of materials and equipment at supply depots. Systematic surveys are needed to insure watchfulness in years of less serious infestation.

7. National Land Policies: There is need for a national land policy which encourages and aids each section of the United States to develop a balanced agriculture in accord with it's resources of land and water and without sectional prejudice.

8. Funds To Be Expended In A Regenerative Program: Funds expended for drought and other emergency employment should be invested in the natural development of the region.

9. County Planning: County planning boards or committees should be established throughout the region and should be continuously contacted in adapting the regional program to local conditions.

10. Unification Of Programs: The various relief, rehabilitation and development programs should be carried out through State Committees upon

which the State Planning Board and all of the Federal and State agencies working on agricultural and related readjustments are represented.

#### Montana's Statement

The Montana statement, presented by the board, reviewed the history of eastern Montana and pointed out that most of our difficulties have been due to a misuse of the land and failure to properly conserve and use the water supplies.

A program of corrective measures was recommended to combine emergency expenditures with a long-time program through the construction of water conservation and range improvement projects. Lists of projects were submitted in the form of a state program which would employ all of those needing employment relief. In this report it was shown that Montana has, in the State Water Conservation Board and the Montana Grazing Commission, the necessary agencies to cooperate fully with the federal government on a long-time rehabilitation program. Further, that this state is prepared with a list of projects fully engineered and ready for construction to meet the immediate situation.

It was further pointed out that there is a need for closer cooperation between federal and state agencies in the formulation and carrying out of their respective programs so as to eliminate duplication of effort and excessive administration costs. Montana therefore, recommended that the President be requested to authorize a state committee on which these agencies would be represented. The duty of this committee would be to formulate a works program, to correspond with the employment needs in every section and county of the state, made up of projects that fit the permanent readjustment needs of that section or county.

The board has believed that this coordination of activities within the state is important. It would accomplish a highly desirable result. The board has feared that the operation of many separate programs, often in dupli-

cation and sometimes at variance with each other, cannot continue to receive general public support.

The unification of these activities into a state program, in the formulation of which the state and the people in the various localities of the state will take part, will result not only in more effectiveness, but in better understanding and in greater cooperation and support on the part of the general citizenship.

A follow-up report was prepared as a part of a regional report to the National Resources Committee dealing with this same problem. In that second report the board emphasized the importance of immediate action in the expenditure of emergency funds on regenerative projects, concurrent with further detailed surveys and studies of the long-time program.

#### STATE REVENUES AND EXPENDITURES

At the special request of the Governor there was instituted, beginning July 1, a study of state revenues and expenditures. A graduate, certified public accountant was assigned to this project by the WPA and served for a period of four months. This study was supplemented by an investigation of the system of revenues and expenditures of other states and territories. This survey was summarized in a series of graphs which show the sources of revenue to the state treasury and the distribution of the funds to the several state agencies; the procedure, in detail, of the methods of handling these monies; the membership of Boards having to do with the expenditures and the control of the same; and the system of checks and safe-guards which have been provided for the sound administration of the various funds. A brief report accompanying these graphs has been submitted. It lists the many boards and commissions together with their duties; also the multitude of boards on which the Governor, the Secretary of State and the Attorney General must serve as ~~members~~ in addition to the regular duties pertinent to their respective offices.

The time available did not allow for a full analysis and comparison of Montana's organization with other states and territories. This however, is being carried on and should be ready for publication shortly after the first of the coming year, 1937.

#### WATER RIGHT LAWS

The staff has undertaken an investigation of Montana's water right laws and their administration, together with investigations of the water codes of all the western states. This includes studies of both state and federal court decisions pertaining thereto. Various state and federal agencies have cooperated, together with certain citizens of the state who are generally recognized as authorities on water right laws.

The field of this subject is extensive and has many ramifications, and the study is being continued. Furthermore, before any final recommendations can be made, there is need for a full discussion with the people of the various communities of the state.

However, certain facts have been determined that point out the most serious handicaps which, if removed, would free the individual water-user from existing confusion, costly delays and expensive litigation. Vested rights established by law and decrees made by the courts cannot and should not be disturbed. But it is possible to make changes which would assure a speedier, simpler and cheaper adjudication of water rights.

A detailed report and summary of the water-right laws of Montana and the other western states is in preparation. This, with the recommendations of the staff will be ready for publication soon.

## MONTANA LAND RESOURCES

Montana has, roughly speaking, an area of 92,800,000 acres. This may be divided into three classes:

Forest Lands	20,300,000 acres
Grazing and waste lands	64,500,000 acres
Crop Land (including irrigated lands)	8,000,000 acres

The ownership of this land is shown in the records of 1935 as follows:

Private-owned Lands	53,900,000 acres
National Forests	17,200,000 acres
Indian Reservations	6,300,000 acres
Public Domain	6,400,000 acres
State Lands	5,300,000 acres
County Lands	2,500,000 acres
National Parks	<u>1,200,000 acres</u>
Total	92,800,000 acres

This ownership may be grouped in another manner as follows:

Federal owned	35.65%
Other Public Ownership	8.46%
Corporate Group Ownership	14.25%
Non-resident Ownership	10.89%
Resident Ownership	<u>30.75%</u>
Total	100.00%

According to the records of the State Board of Equalization, our private-owned lands are classified as follows:

Grazing Lands	31,000,000 acres
Non-irrigable farm lands (not all seeded for cropping)	18,000,000 acres
Irrigated farm lands	1,500,000 acres
Mining and miscellaneous	<u>3,400,000 acres</u>
Total	53,900,000 acres

### Forest Lands

The lands designated as forest lands are those areas primarily valuable for forest purposes. Of the 20,300,000 acres of forest, 3,100,000 are privately owned and the 17,200,000 acres designated as national forest is land which after careful classification, was definitely set aside for that purpose. It is estimated that about 7,000,000 acres of the forest lands are capable of secondary use as grazing lands and are proving their value as such. The section of this report devoted to forest resources describes and discusses this type of land in more detail.

### Grazing Lands

There are estimated to be some 64,500,000 acres of grazing lands in Montana. Of this, 40,000,000 acres are privately owned, 9,500,000 acres is in public domain and county ownership, 7,000,000 acres lies within the forest areas, 5,500,000 acres is within the Indian Reservations and 2,500,000 acres is state owned. In addition to this there is the grazing of our crop lands, adding another 7,000,000 acres of excellent feed value.

It is estimated that at this time there are some 25,000,000 acres of our range lands which are uncontrolled or held under unsatisfactory types of tenure. The creation of the Montana State Grazing Commission, together with the Federal Taylor Grazing Act, gives promise of rapid solution of the lack of control and management of these grazing areas. It would be advantageous to include within these grazing districts the tax-delinquent lands to which counties have not yet acquired title.

### Crop Lands

The raising of hard spring wheat utilizes the major portions of our land classified as crop land. In 1933, there were 4,700,000 acres seeded to wheat. Montana is recognized as producing the highest grade of hard spring wheat in the United States. This wheat has always been in demand by the millers,

bringing a premium over the going market due to its high protein content. There is usually a shortage of this quality of wheat, making it necessary for millers to import Canadian wheat of this grade. Montana should be allowed unrestricted production of this crop, on its better grades of land. This should be given careful consideration in the federal Agricultural program, by those responsible for determining national policy.

#### Program

Montana is already well on its way to a good start in readjusting its land use policy. The State Grazing Commission has been previously mentioned in the control and management of range lands.

The State Water Conservation Board, with the assistance of the Public Works Administration and other federal financial aid, has developed a large program which will ultimately result in providing the supplemental water requirements for irrigated lands and stock water needs. We have, at present, approximately 1,600,000 acres of irrigated lands. It is estimated that we can irrigate an additional 3,500,000 acres. We have the available water supply which can be stored for these additional irrigated areas, as funds become available for the necessary construction. It is absolutely vital to the ultimate successful agricultural program of the state, that the irrigated areas be developed as rapidly as financial conditions will permit. With the necessary amount of irrigated land and stock water facilities distributed throughout the state, we will have largely solved the state needs for a stabilized agricultural and livestock industry.

The Works Progress Administration is actively engaged in an extensive work relief program on small water developments throughout the eastern portion of the state. The Soil Conservation Service is attacking the ever increasing menace of soil erosion. The State Agricultural College together with the Extension Service and other agencies, are engaged in constructive efforts, which are assisting in the ultimate best use of our lands.

The discussion of "Probable Best Land Use", by the Land Use Planning Section, Land Utilization Division, Resettlement Administration, follows this discussion. Together with this is a map classifying the areas according to what is thought at this time to be the ultimate best use of the land. Necessarily it is not correct in detail, but gives a general idea, of what long years of careful study indicate should be the goal. Changing conditions and new discoveries will tend to modify the pattern from time to time.

Ownership of the land, by the man on the land, is another goal toward which Montana is directing its efforts in its land-use policy. An essential part of that program it is necessary that he acquire such an economic-sized unit as will allow him, with good management, to provide a fair living for himself and family, independent of outside aid.

## THE MONTANA LAND PROBLEM

by

F. B. Linfield, Director  
Montana Agricultural Experiment Station

The Land Problems of Montana arose out of the coming of the Stockmen to the State in the early 80's of the last century and then the coming of the settler in the early part of this century. The Stockmen demonstrated that this was a good grass country, as livestock thrived and grew fat on the native pastures. The settler came because he believed the level grass lands would grow agricultural crops. He made a serious mistake, however, in acting on the belief that all grass lands would continue to grow farm crops. While those who had studied conditions knew the settler was mistaken, in regard to certain areas, yet nothing whatsoever had been done to exclude the areas submarginal for successful cropping.

Before the settler arrived, it was suggested to Montana Congressmen that these western lands should not be thrown open to Homestead entry until the Federal Government had made a complete soil and land use survey of the State and only those lands thrown open that gave promise of successful cropping, while the remainder of the country should be held as range pastures only. Such a policy would have saved the early settlers millions of dollars, years of hardship and many disappointments. It would also have saved the Federal Government the millions of dollars that will have to be spent in backing up and finally setting this marginal land back into its proper use. The field cost of such a survey would have been less than \$4.25 per square mile or about  $2/3$  of a cent per acre.

Through the ages, nature has recorded in the soil and its cover, a story of the agricultural use to which these lands could be safely put. We should have had this story 40 to 50 years ago. After much delay a part of it has now been obtained from the soil surveys, but much yet remains to be done. Of the 93 million acres of the State, but 42 million have been surveyed on the reconnaissance basis (See Table III) and a detailed survey has been made of a little over a million

acres. (See Table II) Only a beginning has been made on a cover survey.

### PLOWING-UP OF THE RANGE

Much has been said about the damage resulting from ploughing up the range lands of the State. Apart from the irrigated area, however, I question if 9 million acres have been ploughed and cropped for 5 years, or about 10% of the total area of the State. Much of the early ploughing was soon abandoned and long enough ago to be now covered fairly well with weeds and grass and thus protected from drifting. Other areas where cropping has been continued are being damaged more or less by soil drifting, except where special cultivation and cropping methods are practiced.

However, while but 10% of the area of the State has been cropped except for a very limited time, perhaps 70% of it, or about 53,900,000 acres outside of Federal reserves, has passed into private ownership. The result has been that the ownership of the lands of the State is divided into an immense number of small tracts, much of the dry lands especially in units too small for economic use and also divided among a multitude of owners, large numbers not residents of the State.

A factor, which I believe to be fundamental, is that efficiency in the use and maintenance of land demands some kind of control or management. Land open to the unrestricted use of any and every person cannot have proper care, nor will it produce satisfactorily. We are all willing to concede this in regard to cropped land, whether dry or irrigated, but the same logic undoubtedly applies to range lands, which make up fully 80% of the area of the State, including the forest and other reserves.

It seems to me that the State law setting up the State Grazing Commission has provided perhaps the best method by which these scattered areas of land with a great variety of ownership, can be brought together in reasonable sized tracts for intelligent management and use. This State law makes a good working base, which in a few years should go a long way towards getting much of the range lands of the State on a better management plan.

## Range Land Waters

A very important factor making for the efficient use of the range lands, will be the construction of small reservoirs all over this range country and also the opening up and storage of water from the springs found in many places. In a country as dry as is much of the area in Montana, we should not let any of the moisture, which comes as rainfall and snowfall, get out of the country. We need it all. This cannot be done in a few years, but by systematically working at the task through the years, very much in this direction may be accomplished. Wherever possible dams should also be constructed to divert water onto the land where, by means of contour ditches, the water may be spread over the land and held back until it can soak into the ground. Considerable progress has been made in this direction in several areas in the State. Bulletin 301 of the Montana Experiment Station describes the construction of such dams.

## Soil Surveys

The soil surveys should give us, when completed, a basis from which it will be possible to locate and define the areas best adapted to dry farming, while our research work on methods of soil management and cropping practices should point out how to attain the maximum success on such lands, and also the types of organization by which they can be best associated with the range pastures.

The Montana Station has published bulletins with county maps of the areas where the soil reconnaissance has been completed. (See Table I) These maps show in considerable detail, the types and kinds of soils. Maps have also been prepared, but not yet published, which show by counties, the classification of the land and the location of the 1st, 2nd, 3rd, and 4th grades of both crop and range lands. Much time, a lot of work and considerable expense will yet be needed to prepare this material for publication but this will be done when funds become available.

Some combinations and reorganizations of the present dry farms will be needed. Many are altogether too small for the efficient use of machinery, which must be used to keep down costs of production and give the farmer a sufficient

income. Our studies also show that from one to four sections of land are needed on a summer-fallow system of cropping to give adequate returns to the operator on an average dry farm.

### Irrigation

The irrigated area of the State should be much enlarged. These areas are the real background of the state's whole agricultural enterprise. Irrigation gives a larger crop because it corrects our climatic crop limiting factor, viz., a deficient precipitation. It also gives a more dependable crop because it overcomes the losses from drouth. Increasing the yield and dependability of crops made possible, two and three crops yearly of such forages as alfalfa and clover, gives maximum yields of corn, wheat and other cereals, and an all seasons growth of pasture. Irrigation in addition makes possible a longer growing season and thus a greater variety of crops, as with an adequate water supply, the crops continue to grow until frosts come in the fall, and are not cut short in their growth by the dry weather of later summer and fall. Thus with irrigation, Montana can produce such crops as sugar beets, tomatoes, vegetables, potatoes, etc., with maximum yield and quality.

Irrigation and the large dependable forage crops it makes possible, is a necessary insurance against losses of range livestock or their enforced sale in the dry seasons as feed could be made available relatively near the range country. Irrigation enterprises should, therefore, be developed all over the State. To make this possible, dams, large and small, should be built to hold back the flood waters and the spring runoff from all our mountain streams and in many places on the lower valleys of these streams. These irrigation enterprises should be national, state and community enterprises as all these agencies of the people are benefited, as well as the farmers under the ditches, and these several agencies, should bear a portion of the costs of the development. For the governmental agencies, the development will provide additional taxes and for the local communities it would mean a much enlarged business. This is a new viewpoint in irrigation financing, but I seriously question if further material development is possible without this

broader financing base.

### Experiment Station Publications

In the United States, where the people finally determine policies, intelligent action cannot be had unless every person has the fullest possible understanding of the problems by which they are confronted and also of the many factors leading up to and giving the setting of those problems. The Montana Experiment Station, in cooperation with U. S. Department of Agriculture, has for some years past been carrying forward studies dealing with various aspects of our farm problems. To make the present results of these studies readily available a series of short bulletins has been prepared under the general title of "Readjusting Montana Agriculture". The sub-titles for each of the eight bulletins are as follows:

- I. The Need and Basis for Readjusting.
- II. Montana Farm Prices.
- III. Population Resources and Prospects.
- IV. Land Ownership and Tenure.
- V. Economic Changes in Montana's Range Livestock Production.
- VI. Montana's Irrigation Resources.
- VII. Montana's Dry-Land Agriculture.
- VIII. Tax Delinquency and Mortgage Foreclosures.

Any or all of these bulletins or any others that are available at the Station may be had by writing to the Agricultural Experiment Station, Bozeman, Montana.

TABLE I  
MONTANA COUNTIES

COVERED BY SOIL RECONNAISSANCE  
(Cooperative with U. S. D. A.)

No.	County	Area of County	Date Surveyed	Total Area Surveyed	Per Cent of State's Land Area
1	Sheridan#	1,072,000	1921	1,072,000	1.14
2	Roosevelt#	1,505,920	1921	2,577,920	2.76
3	Daniels#	926,080	1921	3,504,000	3.75
4	Valley#	3,207,040	1922	6,711,040	7.18
5	Phillips#	3,313,920	1922	10,024,960	10.72
6	Blaine#	2,706,560	1923	12,731,520	13.61
7	Hill#	1,850,880	1924	14,582,400	15.59
8	Liberty#	928,640	1924	15,511,040	16.58
9	Choteau#	2,542,720	1925	18,053,760	19.30
10	Toole#	1,253,120	1926	19,306,880	20.64
11	Glacier#	1,907,840	1926	21,214,720	22.68
12	Pondera#	1,061,120	1926	22,275,840	23.82
13	Teton	1,461,760	1927	23,737,600	25.33
14	Cascade	1,733,120	1928	25,470,720	27.23
15	Judith Basin	1,190,400	1928	26,661,120	28.51
16	Fergus	2,766,080	1929	29,427,200	31.46
17	Petroleum	1,066,880	1930	30,494,080	32.61
18	Musselshell	1,162,880	1930	31,656,960	33.85
19	Golden Valley	778,240	1930	32,435,200	34.63
20	Wheatland	903,040	1931	33,338,240	35.65
21	Meagher	1,516,160	1931	34,854,400	37.27
22	Broadwater	771,840	1932	35,626,240	38.09
23	Custer	2,394,240	1934	38,020,480	40.65
24	Lewis & Clark	2,206,080	1936	40,226,560	43.01
25	McCone	1,692,800	1936	41,919,360	44.82

# Printed report available for distribution

TABLE II  
IRRIGATED AREAS  
COVERED BY DETAILED SOIL SURVEYS  
(Cooperative with U. S. D. A.)

Area Surveyed	Acreage Surveyed by Projects	Year	Gross Acreage Surveyed
Sun River Irrigation Project	148,720 A	1925	148,720 A
Valiér Irrigation Project	160,000 A	1926	308,720 A
Milk River Valley Area	624,000 A	1927-8	932,720 A
Lower Flathead Valley Area	300,160 A	1929	1,232,880 A
Gallatin Valley Area	513,280 A	1930-1	1,746,160 A
Lower Yellowstone Valley Area	262,400 A	1931-2	2,008,560 A
Middle Yellowstone Valley Area	224,000 A	1932-3	2,232,560 A

Detail Surveys Conducted in Early Years by the  
U. S. Bureau of Chemistry and Soils

Bitterroot Valley	327,000 A	1914	327,000 A
Billing Area	68,416 A	1906	395,616 A
Gallatin Area (Forest Survey)	523,500 A	1908	918,916 A

In addition to the Detailed Soil Surveys conducted cooperatively with the Bureau of Chemistry and Soils, U. S. Department of Agriculture, the Agronomy Department has independently surveyed and mapped the soils and prepared type-written reports for several smaller irrigation projects, existing or proposed, at the request of various agencies.

Area Surveyed	Acreage Surveyed by Projects	Year	Gross Acreage Surveyed
Wilsall Irrigation Project Park County	10,880 A	1921	10,880 A
Clark Fork Valley Irrig. Project Sanders County	3,290 A	1923	14,170 A
Camas Division Flathead Irrig. Project Sanders, Lake & Missoula Counties	16,500 A	1924	30,670 A
Tongue Yellowstone Irrig. District Custer County	10,000 A	1925	40,670 A
Buffalo Rapids Irrigation Project Custer County	4,000 A	1932	44,670 A
Terry Area Prairie County	9,600 A	1932	54,270 A

Proposed Vaughn Division, Sun River Project, Cascade County	26,880 A	1933	81,150 A
Lower Campbell Ranch Cascade County	20,480 A	1934	101,630 A
Whitetail Irrigation Project Jefferson County	21,760 A	1934	123,590 A
Flatwillow Creek Area Fergus, Musselshell & Petroleum Counties	96,000 A	1934	219,390 A
Bear Creek Subsistence Project Carbon County	280 A	1934	219,670 A
Chesnut Valley Irrigation Project Cascade County	4,000 A	1934	223,670 A
S. H. Ranch Custer County	1,000 A	1934	224,670 A
Teton Land Company Holdings Teton County	35,000 A	1935	259,670 A





## PROPOSED BEST LAND USE

Prepared by: Montana Land Use Planning Section,  
Land Utilization Division, Resettlement Administration.

In a state so directly dependent upon agricultural land resources as Montana, it is essential that careful consideration be given to the problems concerned with the best use of the land. Such considerations are imperative if we are to realize a desirable and relatively stable standard of living for as many people as possible.

Best land use is achieved when the balance between natural resources is such that a desirable standard of living is possible without depleting or wasting natural resources, namely soil, plants, and water.

Obviously best land use according to the above criteria has not been achieved up to the present time. As a matter of fact all evidence shows a trend in the opposite direction through no conscious fault of any individual or group of individuals. The causes of this trend start with the perfectly legitimate exploitation processes and along with innumerable other factors continue down to recent times when economic pressure has compelled the individual to further exploit his land resources even against his best judgment. Such a "mining" of natural resources is a natural tendency and will probably continue until either the resources are exhausted and cease to support very many people or some group action is taken which will forestall the decadence of our agriculture as a result of a "do nothing" policy.

In consideration of these facts land utilization studies are being made in an effort to contribute toward the foundation of a sound policy regarding the use of land. The accompanying map is designed to bring to the attention of the public some of the factors necessary in formulating a program.

Circumstances are forcing rapid changes in land use which normally would cover long periods. Consequently it will be necessary to revise this map as rapidly as new data and judgments permit. Anticipations are that this map and data upon which it is based will be of assistance to those who may be facing immediate change as well as those who are planning long-time adjustments.

The following explanations describe the type of farming that are indicated on Probable Best Land Use Map.

#### Cash Grain Farming Areas

Those areas designated as being suited to a straight cash grain type of farming usually have a combination of good soils (first and second grade farming land) and favorable topography, being rather level and in sizable tracts. In addition such areas are generally favored with higher precipitation and are much less affected by extreme variations in climatic conditions than many areas that are now raising wheat as a major enterprise.

As a result, although essentially suited to wheat raising there is some question concerning the permanence of a straight cropping system even in better areas because of erosion and fertility problems. Good farm management will become more and more of requisite of successful farming in the future especially in the Great Plains area.

#### General Farming Areas

The wide diversity of products raised is the essential characteristic of a general type of farm. Moreover, the farming practices are usually more intensive although this is not universal. The produce of a general type of farm may include dairy products, poultry, hogs, truck crops, fruit, special seed crops, some cash grain crops, farm flocks of sheep, and small beef herds. As shown on the map there are quite expansive areas where general farming will probably be the best use of the land even outside of the irrigated sections.

### Livestock Areas

Livestock areas are characterized by a relatively high percentage of the better grades of grazing lands with a corresponding high percentage of resident ownership which either controls the use of the range lands or could be blocked up by means of a limited amount of assistance through credit or a change in the method of disposal of land that has become subject to tax deed and has been taken over by the county.

### Grazing Areas

Areas in which community action is necessary to aid in the control and adjustment of land use have been designated as grazing areas. The objectives and purposes of this type of action might be to, first, control and adjust the land use in the area and then assist in the establishment and ownership of individual ranch units, or to reduce operating costs to the extent that continued cooperative control will be justified. The agencies already set up to attain these objectives, namely the State Grazing Districts and Taylor Grazing Districts are by no means the only alternatives in obtaining cooperative action, however, they might well be used as a guide.

### Irrigated Areas

The irrigated areas shown do not include all of the irrigation in the state, but rather the areas that have relatively large blocks of irrigated land. Neither is any attempt made at differentiating between areas on the basis of adequacy of water, drainage problems, or other physical or financial differences. For the most part the farmers in these areas operate a diversified type of farm although some areas specialize in certain products. It is not anticipated that there will be much change in type of farming on irrigated lands in the near future although it is quite possible and likewise desirable that greater use will be made of irrigated areas adjacent to range lands for the purpose of achieving greater stability in the livestock industry.

### Combinations of Types of Farming

In any single area designated as being suited to a certain type or combination of types of farming, there will, probably be other types of enterprises, which by the very nature of their organization and management or natural factors, will be entirely justified and will conform to all of the principles involved in carrying out a best land use policy. The number and types of exceptions will vary widely in different localities.

Where two types of farming have been indicated for the same area, there may be various combinations of the two types within a single farm unit while other farms may have but one of the indicated types. However, the majority of farms will fall in the first category.

ECONOMIC PRINCIPLES IN THE MONTANA  
WATER CONSERVATION PROGRAM

By D. P. Fabrick, Chairman,  
Montana State Planning Board

Part of address delivered before the National  
Reclamation Association in Spokane November, 1936

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We believe that it may be worthwhile to discuss certain new features that have been incorporated into the legal and financial set-up of Montana Water Conservation projects. These were proposed by the Montana Board in the belief that through these new features we might correct certain policies, heretofore generally practiced in reclamation which we believed required alteration in the light of changing conditions. It must be distinctly understood that in making certain suggestions for a modification of reclamation policy, we are not critical of Federal Reclamation, to the contrary, we are most enthusiastic and sincere in our support of Federal Reclamation and believe that its value to the West and to the nation as a whole has never, as yet, been fully estimated or appreciated.

In fact, we are not at all sure that upon complete analysis it would not be found that the Federal expenditures made through the reclamation service have not already been fully repaid indirectly to the National Business Community, even though default has occurred in the repayment charges against the settlers as originally set-up. And we must not forget, that present conditions are quite different from those that led to the formulation of Federal Reclamation Policy some thirty or forty years ago. At that time reclamation policy was designed to satisfy the land hunger of an emigrating population whereas now we have to meet the economic needs of an established population in the West. At that time the great value was placed upon land and upon the acquisition of land and naturally the legal and financial set-up of reclamation enterprises

was tied to, based upon and secured by the land. Now, however, the great need is for the use of water in order to establish a home with a dependable livelihood.

### Present Difficulties

The Montana plan is designed to avoid difficulties that have resulted from certain reclamation policies believed to be unsound in the light of these many years of experience, as well as changed economic conditions within the nation as a whole. The policies which we have been able, at least in part, to eliminate from our Montana set-up are:

1. The requirement that the water users should repay the entire construction cost.
2. That the repayment charge be secured by a lien on the land.
3. That the repayment charges constitute a joint obligation on the part of all the water users on the project.

With reference to the first modification, we were opposed to the requirement that the water users should repay the full construction cost on the ground that such requirement is illogical, unjust, and creates a charge, in many instances, in excess of the individual benefits to the water users. It should be kept in mind that the water users represent only one of many groups receiving benefits from reclamation development. Other state and nation-wide groups of beneficiaries from reclamation are represented by the transportation, manufacturing, professional and merchandising interest of the country. Studies recently made for the Yakima Valley Irrigation Project and for the Yellowstone Valley in Montana, very clearly prove that these areas provide a large and stable market for the products of industry even in years when the agricultural production itself may not yield a direct profit. We believe that the annual profits derived by the manufacturing, transportation, professional and merchandising interests of the country, resulting from the reclamation development in these two and other similar areas of the West, are

at least as great as the profits derived by the farming population in the same areas.

The combined total of such nation-wide benefits justify a contribution from public funds towards the construction cost of reclamation projects. The water users represent only one group of beneficiaries and it is unjust and it has proven impractical, as a general policy to require that they alone repay the entire construction costs. In fact, when default occurred upon such payments, it was not the water user that failed, but rather the repayment system that no longer fits logically into the economic conditions of the west or of the nation. The Board believes in the strict fulfillment of the conditions of contracts with water users. But the default upon such contracts may be best avoided by a sound and logical conception of the nature and extent of the obligation on the part of the water user in determining the logical charge to be paid by him for the use of the water.

#### The Lien on the Land

With reference to the second change, we believe that the repayment of the construction cost in the form of fixed indebtedness against the land, should be substituted by a utility charge based upon the direct value derived from the use of water by the water user. In accordance with this principle, the Public Works Administration is accepting from the State Water Conservation Board, its Revenue Bonds, secured by the income from the sale of water, and not by a lien on the farms in the district. We believe that reclamation is the most logical and the soundest public utility enterprise that might be developed by Federal or State governments. The two essentials for a successful public utility are a perpetual market and a perpetual resource or commodity.

As to the market, in our western states, the semi-arid climate itself, together with much productive land, assures a perpetual market for the use of stored and controlled water.

As to the resource or commodity to be furnished to the consumer, water is the only known natural resource that is self-replenishing through

the operation of natural law. While it constantly, and for ages, has flowed away from our mountain regions, its supply is annually replaced and will last as long as nature continues its present course.

The original conception in reclamation which required the repayment of construction costs in a limited number of years by the water users may have seemed entirely reasonable at that time. It now seems equally reasonable, after a generations' experience and changed economic conditions, that the states, in cooperation with the Federal Government, might well develop the storage and delivery of water, as a state-owned public utility to be perpetually owned by the State; selling a perpetual resource to an equally enduring market and charging for the commodity a utility charge based upon the value of its use to the consumer.

#### The Joint Obligation

The third difficulty, the joint obligation on the part of all the water users for the repayment of the construction charge, has been eliminated in Montana Water Conservation Projects. Experience has shown very clearly that in all projects or districts where such joint obligation exists, that it is not operating as an aid towards securing the payment of water charges, but that, to the contrary, it very definitely retards such payments.

Under the joint obligation, the success of the individual farmer is inter-dependent with the success or failure of his neighbors. The reward for personal effort is made uncertain by the possible failure of others. This condition deadens individual enterprise. It causes hesitancy on the part of successful farmers to make payments so soon as a certain number of others become delinquent. On the other hand, where the water charge is made an individual obligation on the part of each farmer, the successful farmer becomes the leader in the district and all will endeavor to follow his example for their own benefit. This condition encourages enterprise and it answers the natural desire of all men to succeed and be independent.

These changes do not result from economic theory, but represent the

practical ditch-bank point of view.

A sound program, if developed, will result in a change in the attitude and interest of the general public and of the Congress toward the storage and use of our water resources, recognizing it as a national problem, a national benefit and a national necessity, instead of a local Western problem. We believe that the presentation of a sound program that can be sold to the Congress on the basis of Federal construction and control of the large enterprises and of State and Federal cooperation for smaller projects will result in more substantial Federal support.

## GRAZING DISTRICTS

By N. W. Monte, Administrator

Montana Grazing Commission

For several years, prior to 1933, stockmen of Montana had been discussing the feasibility of some form of controlled grazing. This was caused by the uncertainty of open range conditions as was existing then. The small amount of public domain land was setting the policy of all lands in any particular area in which said public domain lands were included. There was no way of acquiring public domain through lease or purchase in order that tracts of land could be blocked for proper utilization. Our County lands could not be leased.

Stockmen were reluctant about developing water on ranges they had no control of. Developing water was just an invitation for itinerant stock to come in. When prices were high, Main Street went into the livestock business to the detriment of the legitimate stockman.

It was a case of turning your stock out as early in the spring as possible, utilize all the available grass and then bringing back to pastures in the late summer or early fall. This caused competitive leasing of available lands for fall and winter pastures at prohibitive prices.

In order to meet the increased cost of operation the stockman increased his herd, thereby decreasing his reserves of grass and feed. When a drouth came along, having no reserve grass or feed, he was forced to sacrifice his breeding stock and either went broke or suffered a setback that took him years to recover.

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The first experiment in cooperative Grazing Control was launched in 1929 by ranchers of the Lower Mizpah-Pumpkin Creek area with 17 members and 108,000 acres of grazing land. This area is comprised of 45% R.R. 25%

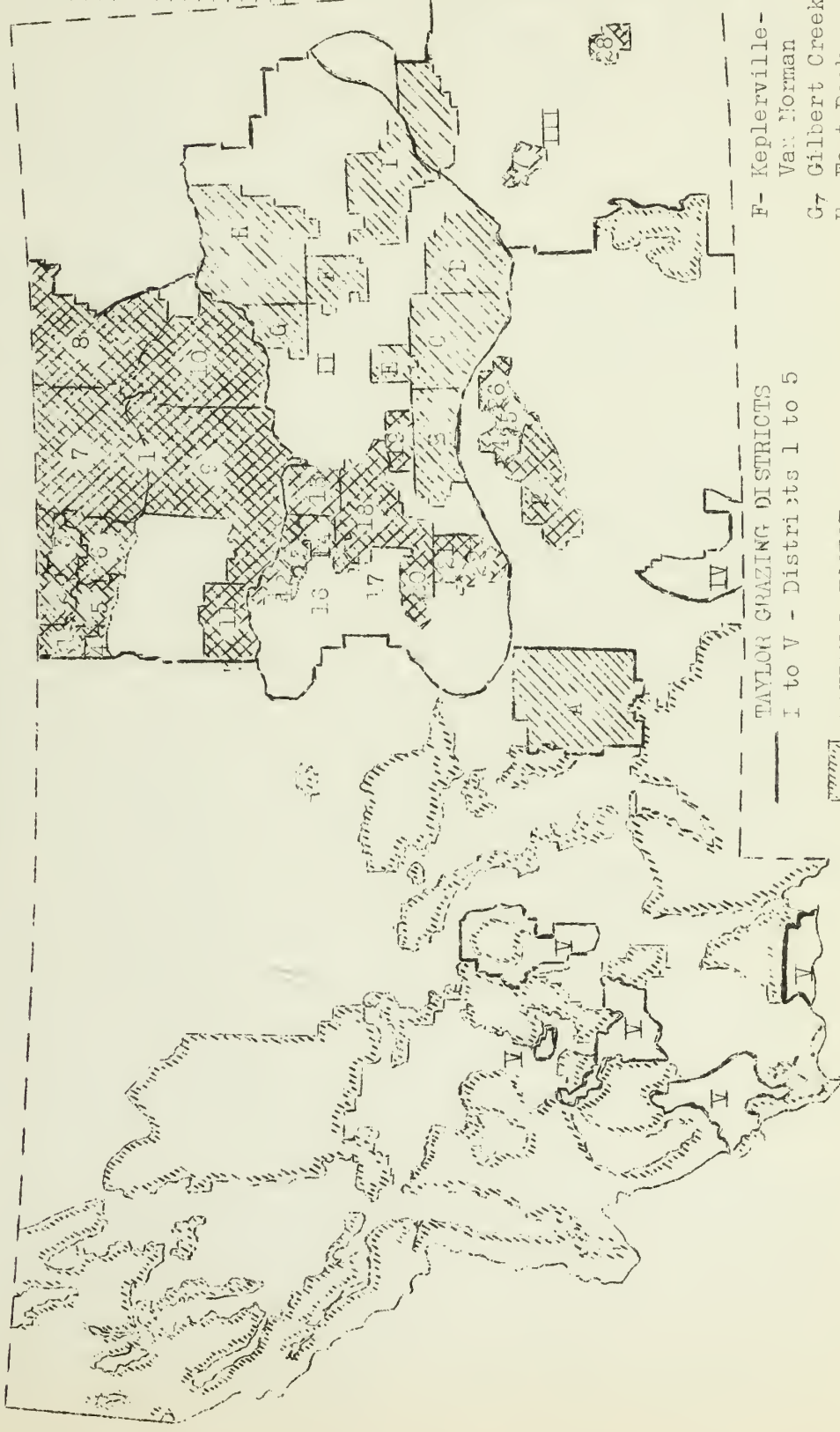
- 1 North Fork
- 2 Cherry Ridge
- 3 Big Flat Woody Island
- 4 Lohman
- 5 Coal Creek
- 6 Wayne
- 7 North Phillips
- 8 North Valley
- 9 South Phillips
- 10 Badlands
- 11 South Fear Paw

- 12 Fergus No. 1
- 13 Indian Butte
- 14 Crooked Creek
- 15 Chain Butte
- 16 Petroleum-Fergus
- 17 Three Buttes
- 18 Winnett
- 19 Weeda
- 20 Flat Willor
- 21 Devil's Easin
- 22 Pole Creek
- 23 Buffalo Creek
- 24 Alkali
- 25 Fort Pease
- 26 Froze-To-Death
- 27 Mizpah-Pumpkin
- 28 C & B

DISTRICTS  
NOT FULLY ORGANIZED  
NOT CR APPROVED  
BY DEC. 1, 1936.

- A- Sweet Grass
- B- Twin Buttes
- C- Rosebud Co.
- D- Sunday Creek
- E- Brunelda

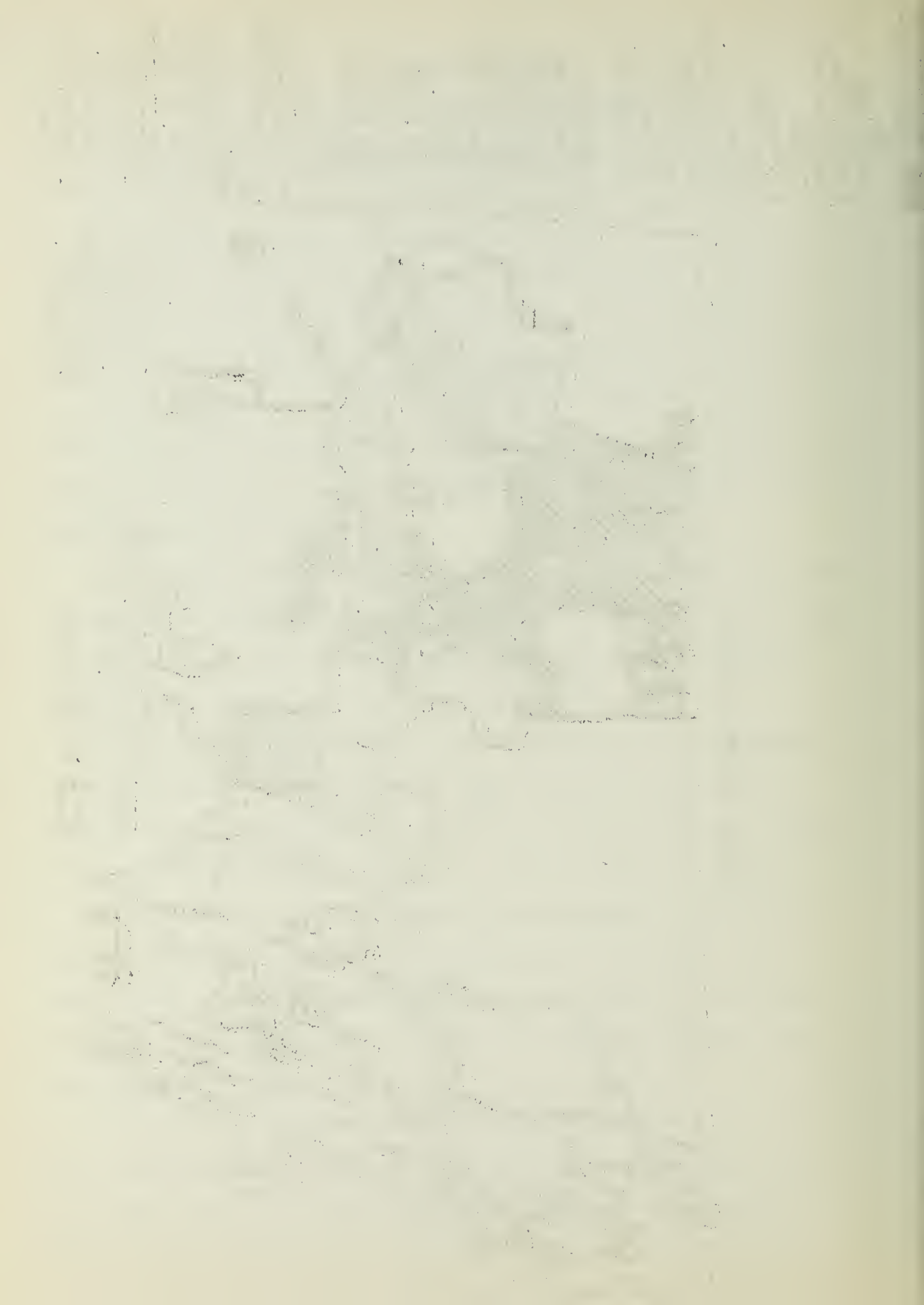
MONTANA GRAZING DISTRICTS



TAYLOR GRAZING DISTRICTS  
I to V - Districts 1 to 5

NATIONAL FOREST

- F- Keplerville-Van Horman
- G- Gilbert Creek
- H- Fort Peck
- I- Prairie Co.



public domain; 6% State; 3% County and 21% non-resident.

The venture, being something new, took two years to accomplish with the cooperation of the Montana Agricultural College and Extension Service, Miles City Commercial Club, Forest Service, Northern Pacific R. R.; Milwaukee R. R. Through its Agricultural Department, Montana Livestock Association, Montana Livestock Sanitary Board and individual efforts by business and professional men of Miles City and elsewhere.

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Other lands were leased on a tax lease basis. At one time prior to the formation of this district approximately 6,000 head of stock were grazing on this area. After control was set up, the carrying capacity was set at 3,000 cow units for an 8 months grazing period.

This district has been functioning for the past 7 years; 60 stock-water reservoirs have been constructed; 23 miles of fence was built and rodents were eradicated. During this period we have experienced three severe drouths, 1931, 1934, and this year. During 1931, when livestock was being shipped out by the trainloads, this area was able to graze the full length of their grazing period and shipped normal weight stock that fall.

During 1934, considered the most severe drouth ever experienced in Eastern Montana, this area made a reduction of about 25% while the contiguous areas of open range reduced 75% or more. While the Government Drouth Purchase of cattle at this time paid an average price of \$7.03 for calves, \$14.26 for yearlings, the members of the Mizpah-Pumpkin Creek district received \$10.00 to \$10.50 for calves and \$20.00 for yearlings from feeder buyers.

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This year, 1936, the grass started in excellent shape and would have carried the stock until fall, but the grasshoppers, not being respecters of law, fences or grazing control, came along and cleaned this area with the rest of the country. A grass survey, made in 1935, shows the controlled

area has two to three hundred per cent better coverage than open range areas lying adjacent. This is sufficient proof that over-grazed areas are more seriously affected by drouths than a well managed range.

Realizing the chaotic condition existing in Montana and knowing that some form of legislation, for the administration of public domain lands was forth coming, the 1933 State Legislature enacted the grazing law known as Chapter 66. This Act provided for incorporation of Cooperative Grazing District Association to aid in the conservation, restoration, improvement and use of forage resources in the State of Montana; to authorize such associations to lease, purchase or otherwise to provide for the management and use of such land, that will best conserve, restore and improve the forage value thereof, etc. Under this Act, 96 associations were incorporated, but it was realized that some central authority or coordinating head was necessary in order to function properly. The Taylor Act was approved June 28, 1934. These called for a revamping of our grazing law.

At the 1935 session of the Legislature, Chapter 66 was amended and the Montana Grazing Commission created, to administer, regulate and improve such grazing districts as are now incorporated, or as may hereafter be incorporated, under the laws of the State of Montana, and to make such rules, regulations and establish proper services and standards therefore, enter into cooperative agreements, establish more uniform by-laws and regulations within and among the said various cooperative grazing associations, and in order to effect full cooperation with the United States and the Director of Grazing under the Taylor Act.

The Montana Grazing Commission was organized May 20th, 1935. Since, uniform by-laws have been established, fair practice rules and regulations have been adopted and a Procedure of Approval of the Commission has been promulgated. A Cooperative Agreement with the Division of grazing has been approved by the Secretary of Interior. Concessions

have been made to approved State Districts by the N. P. Railroad and different counties.

In going into the field we found considerable confusion caused by over-lapping boundaries, lack of authority and other causes. Wherever possible we asked small districts to merge into larger units in order to spread the responsibility and avoid confusion. In one instance we merged 62 districts into four.

At the present time 26 approved State Association Districts are functioning, having over 7 million acres of grazing land and over two million acres of commensurate land. Of this nine million acres, over two million acres is public domain land which has been acquired by signing the Cooperative Agreement with the Division of Grazing.

The stockmen of Montana, Federal Agencies and the Montana Grazing Commission realizes that owing to the checkerboarded condition of land ownership all lands must be included under one head for proper utilization and proper administration. There being no provision in the Taylor Act for the administration of other than public domain land, the stockmen realize that only through State Associations, cooperating with the different Federal Departments and other land agencies, can this be accomplished. State Associations give the stockmen of any given district the right to run their own business. All that is asked of them is that they shoot square with one another and not overgraze.

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There are, 53,976,614 acres of grazing land in Montana besides the 25,000,000 acres included in Forest Reserves, Indian Reservations and Parks. Of this twenty five million acres, possibly fifteen or more million can be classed as grazing land. This gives 75% of the total area of Montana as grazing land, with approximately 50% at the present time subject to unrestricted grazing.

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In our contracts throughout the state, we find the majority of stockmen who have overstocked free public range in self protection, will gladly welcome the opportunity to make reductions to actual carrying capacity when these ranges are placed under control and the feed for the livestock is assured. This is clearly shown in the amount of districts that were approved in the past year. After taking it on the chin for the past six years, the drought this year has left him bewildered and discouraged and rather reluctant to assume obligations in the form of grazing districts which will call for a fixed cost each year for lease, rentals and improvements. Considering the small amount of stock to graze they feel that this is the opportune time to set up projects for the improvement of our ranges. The range is understocked and stockmen and farmers in need of work. They ask for a job, not a dole.

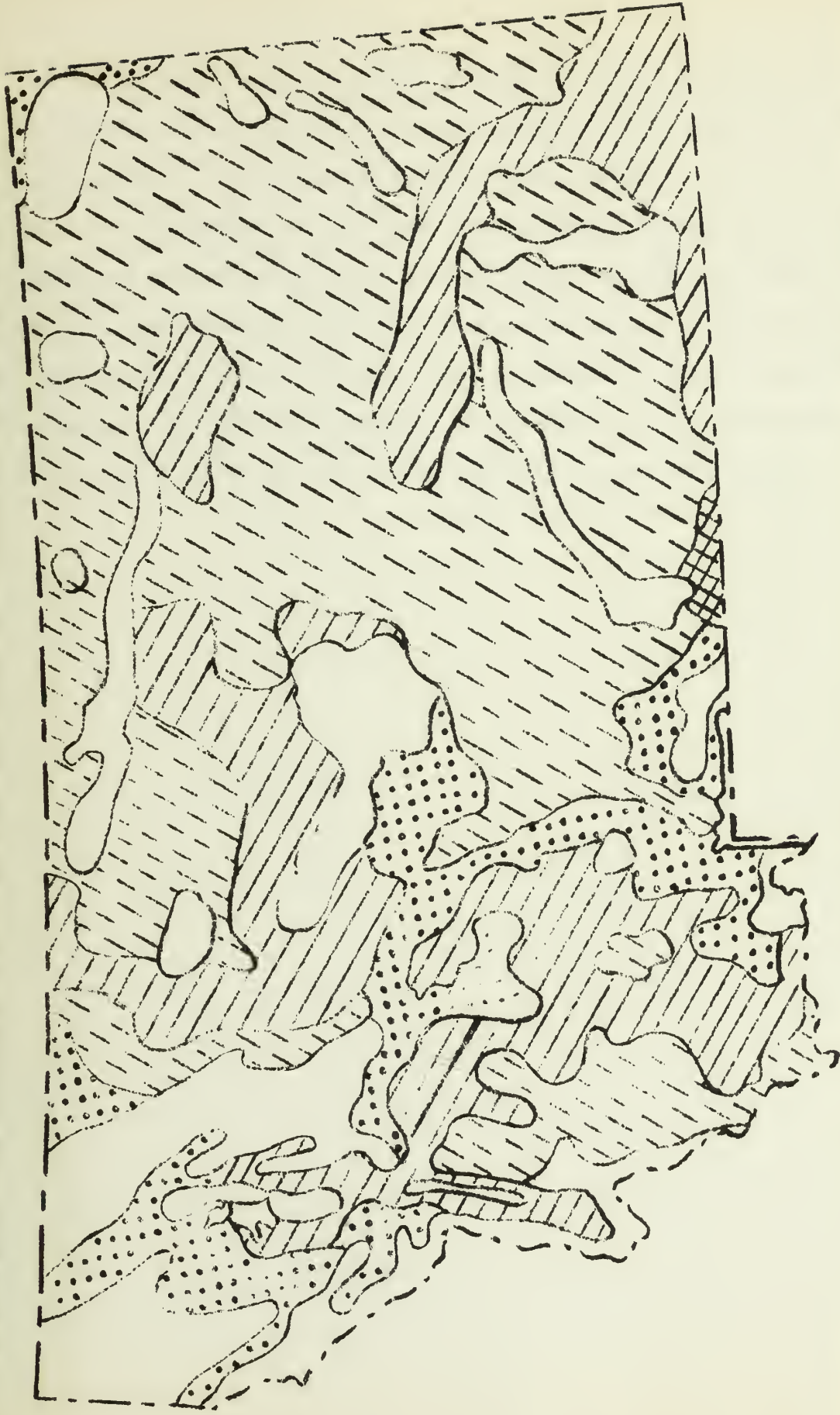
With control of the range and sufficient stockwater to properly distribute the stock on the range, long time management plans can be worked out. Ranch management surveys in this State indicate the lack of stockwater and control as two prime factors in proper range management. Proper range management (sufficient stock-water) will hold over reserve grass for drouth years and will be of benefit to the entire community. They are the foundation for prevention of winds and water erosion of the ranges and will diminish the evil effects of drouth years which now threaten to bring ruin to the livestock industry of the eastern two thirds of Montana.

When we realize that grass is one of the biggest assets Montana has and that livestock is the foundation of the business structure of eastern Montana, it is time that we Stop-Look-Listen.

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In order to derive the fullest benefits from range improvements all lands must come under some form of range control. Building improvements

# DEGREE AND EXTENT OF FORAGE DEPLETION ON THE PRESENT MONTANA RANGE



- 0 - 25% DEPLETION
- 26 - 50% DEPLETION
- 51 - 75% DEPLETION
- MORE THAN 75% DEPLETION
- PRIMARILY NONRANGE LAND



on unrestricted range will invite promiscuous grazing and cause the ranges to be overgrazed in a more severe manner than in the past; thus defeating the purpose for which said improvements were made.

We realize that the land use adjustment problem is a big problem that will not be worked out in a short length of time. No doubt we will make mistakes, but, by correcting our mistakes as we go along, we will be able to make progress. It is my firm belief that through cooperative effort, the livestock industry can be stabilized and Montana ranges, in time, brought back to their productiveness of thirty years ago.

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## WATER RESOURCES

### GENERAL

The eastern two thirds of Montana has a semi-arid climate with a precipitation of between 10 and 15 inches per annum. In this area the precipitation is almost entirely in the growing season with only about 25 to 30 percent in the winter. In the mountainous districts and the extreme north-western portion of the State the annual precipitation rises to from 20 to 30 inches per annum. Here the total precipitation is larger, but the increase is entirely in the shape of snow and winter rains so that irrigation generally speaking is as necessary in the areas of high precipitation as it is in the drier sections.

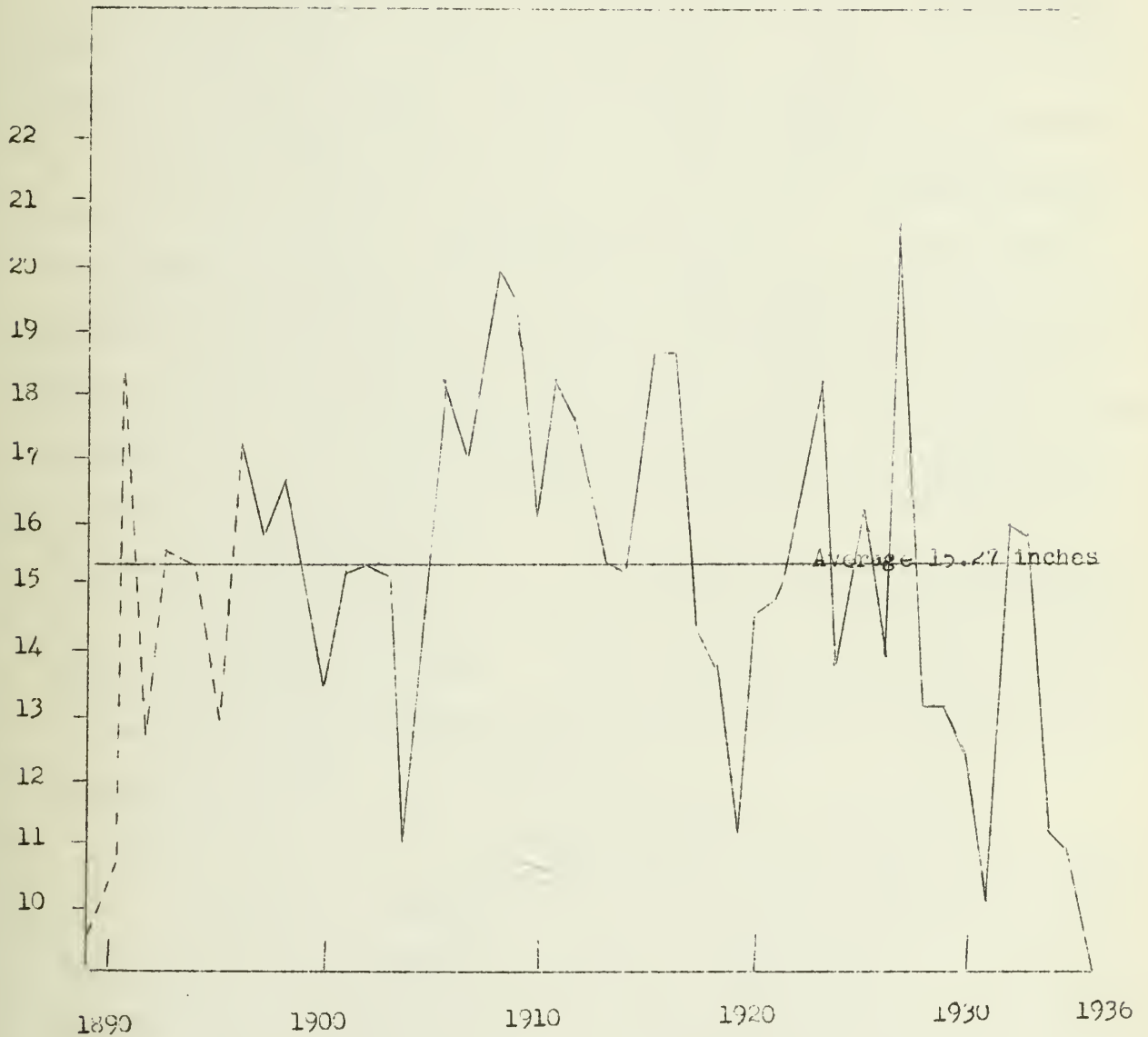
For successful farming, therefore most sections of the State require irrigation. Exception should be made of the acreage scattered throughout the State where, with favorable soils, the summer precipitation is sufficient in most years for the growing of small grains through dry farming methods. This is estimated to be about 6,000,000 acres. In the larger streams of the state the flow is irregular, with about 70% of the run-off coming in the months of May, June and July and the extreme low water continuing from August to February.

Underground water supplies consist principally of shallow ground water, with limited areas showing a relatively small artesian flow. The underground water table, which up to the last few years has been fairly close to the surface, has receded to such an extent that in many places shallow wells and small springs have completely dried up and deep wells have demonstrated that the water is much farther below the surface than formerly.

In the mountains and foothills of the State the late summer flow has been over appropriated and is fully used even in wet years. In the eastern one-third of the State the heavy summer rains in general are allowed to go to waste.

# MONTANA ANNUAL PRECIPITATION

BELOW NORMAL	25 YEARS
ABOVE NORMAL	20 "
AT NORMAL	<u>3 "</u>
	48 YEARS





The further development of agriculture is entirely dependent on storage of flood waters and the stabilization of most of our present irrigated areas requires storage for late summer irrigation.

#### Eastern Montana

In the Eastern one-third of the State, which is a portion of the Northern Great Plains, the country is rolling to level and the precipitation is mostly in summer rains. In order to conserve the run-off it is necessary to begin at the moment the water touches the ground. This means the restoration to the fullest possible vegetative cover, contour furrowing where possible, flood irrigation, and small reservoirs which can be used for irrigation and stock watering. There are a few reservoir sites along the larger streams, which can be developed at reasonable cost. These include the Little Missouri River, the Powder, Tongue, Clark Fork and Big Horn Rivers of the Yellowstone Drainage and the Poplar River of the Missouri Drainage. If the water is stored too far down the rivers there is often not enough available land to use the full amount of water stored.

The Fort Peck Dam now under construction, primarily for navigation is capable of storing 3 to 5 years run-off of the Missouri River at that point, but the area which can be irrigated from this storage can utilize only a small percentage of the water.

#### Central Montana

The Central third of the State is the foothill country with higher relief, more living streams and in general a large spring run-off caused by melting snow. The headwaters of most streams are in forested areas, generally in the National Forest. The valleys are susceptible of irrigation and the low water flow of practically all streams is fully utilized. Junior water rights are always cut off in July and in dry years may be cut off in May.

In the mountain valleys there are many natural reservoir sites, which

can be developed for the storage of melting snow and high-water run-off. There is an excess of irrigable land as compared with the water supply which can be economically used, so that the question is one of water and not of land.

#### Western Montana

The Western third of the State, which is the Columbia Drainage and the mountainous area, is in large part included in the National Forests. In the mountain valleys, irrigation is largely practiced and we have the same shortage of water for late irrigation that we have in the foothills. When these waters are stored they will fully irrigate the irrigable land.

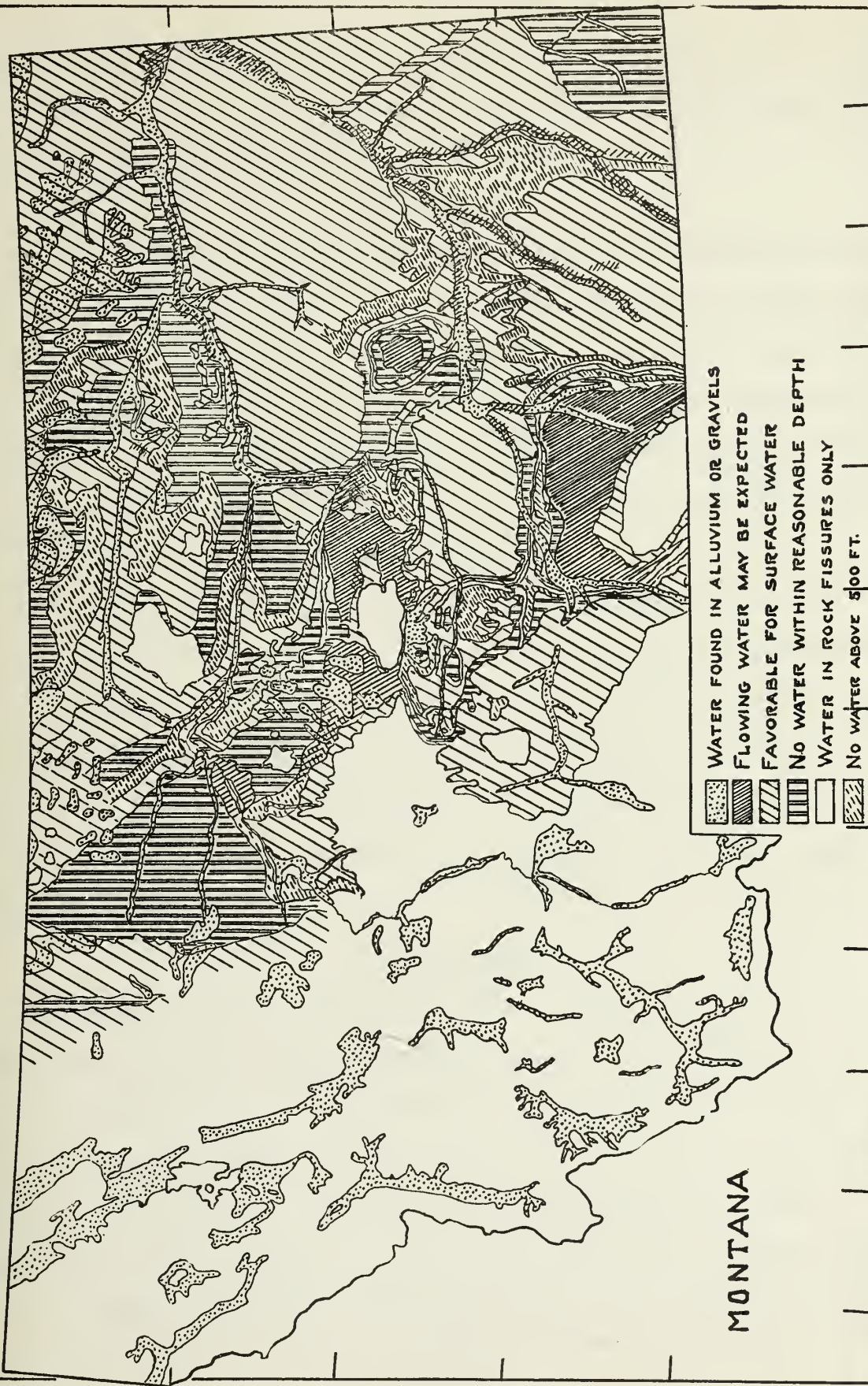
#### The Little Missouri

The Little Missouri Drainage Basin, is a range country and except for a small area in Wibaux and Fallon Counties is best adapted to stock-raising. The present production of winter feed is less than the amount needed to provide for stock capable of being carried on the adjacent range. Storage is needed in the Little Missouri River, in Box Elder Creek and in Beaver Creek to rectify this shortage. There is also a need for flood irrigation and other means of storage in the ground. Ground water supplies in shallow wells are sufficient for watering stock and domestic purposes.

#### The Yellowstone

On the Yellowstone River, more than four-fifths of the water is not utilized, yet there is need for storage of the high water run-off to maintain the late summer flow in sufficient amount to allow direct diversion for present irrigation systems along the river. Storage is also needed in the tributary valleys for use in the production of livestock feed and for general farming. Underground water supplies consist of shallow ground water, which is present over about one-half of the area of the basin and in certain parts of the area artesian conditions exist. Between 300 and 400 flowing water wells have been

# GROUND WATER AREAS





completed, depth ranging from 100 to 2,000 feet or more. Some of this water is too heavy in alkali for stock water, but there is sufficient good quality underground water supplies for domestic and stock use.

#### The Missouri

In the Missouri River Basin below Great Falls conditions are similar to those in the Yellowstone Basin, with the exception that in northern Montana there is a heavy glacial drift covering most of the area within 75 miles of the Canadian boundary. In this glacial area water suitable for drinking can generally be secured within 100 feet of the surface. There are about 200 artesian wells completed within this area, but in many of these the water is too highly mineralized even for stock water.

Storage is needed on practically all of the tributaries of the Missouri for late irrigation and all of the run-off of the tributary streams can be used there being an excess of land over water supply. In the territory below Great Falls there is also need for flood irrigation and storage of water in the ground by approved practices. In the area above Great Falls, foothill conditions exist and there are many reservoir sites where flood waters can be stored.

#### The Columbia

In the Kootenai and Clark Fork of the Columbia Basins there is a large excess of water in the main streams, but all of the irrigable valleys need additional storage to fully utilize the irrigable land. In most cases there is sufficient run-off for the land available if the winter and spring run-off is stored for use. The additional precipitation which occurs in these basins comes entirely in the winter and irrigation is needed for dependable farming. Underground water supplies are confined to the alluvial

valleys and in these sufficient water for domestic use can generally be secured at a reasonable depth and of satisfactory quality.

#### Information Needed

In all sections of the State, there is lack of data on the run-off and maximum and minimum discharge of the tributary streams. There are sufficient measurements on the larger streams, but many more gaging stations are needed to aid in the design of control works on the tributaries. These gaging stations should be established as soon as possible, as records for a considerable period of time are necessary in order to give not only the average annual run-off, but also the maximum flow which must be taken care of.

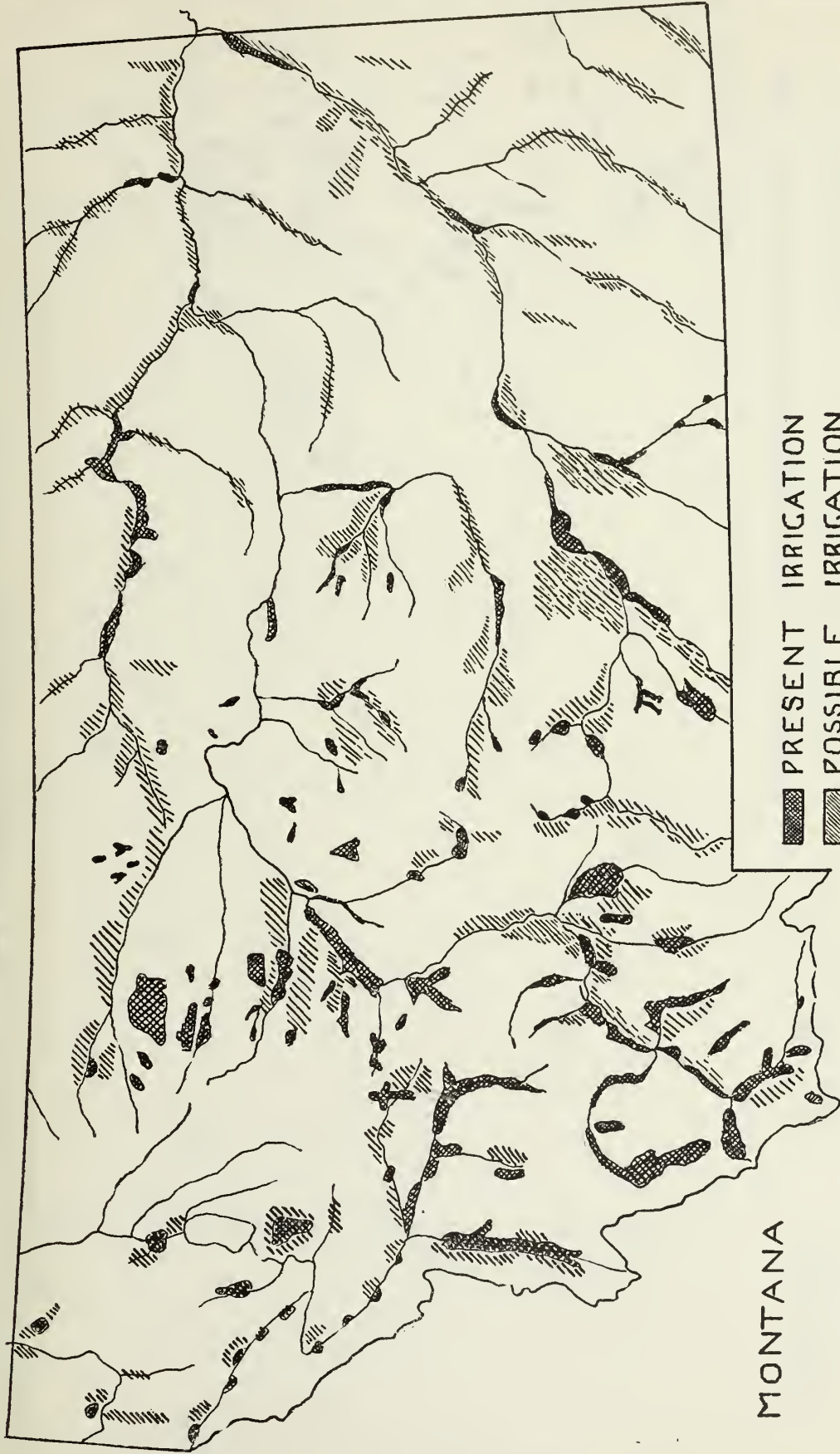
There is need for automatic recording rainfall stations, especially in the mountains and also for snow surveys. The snow surveys are especially needed in order to forecast the water supply to be expected during the coming irrigation season, so that farmers can forecast their irrigation supplies. In the operation of the Fort Peck Dam, the U. S. Army Engineers have established snow measurement courses in the mountains and they expect to maintain these continuously. There is, however need for additional stations of this kind to cover the balance of the mountainous region and furnish a basis for estimating the amount of water which will be available in each stream.

#### State Projects

The Montana State Water Conservation Board has made an extensive examination of the state and has surveyed many possible storage sites for water.

They have made application to the P. W. A. for funds for 48 projects for storage and irrigation, of which the total cost would be \$13,948,364. Of these, nine are under construction, or contracts have been let and in addition money has been allocated for two, representing a total cost of

# DIAGRAMMATIC IRRIGATED AREAS MAP



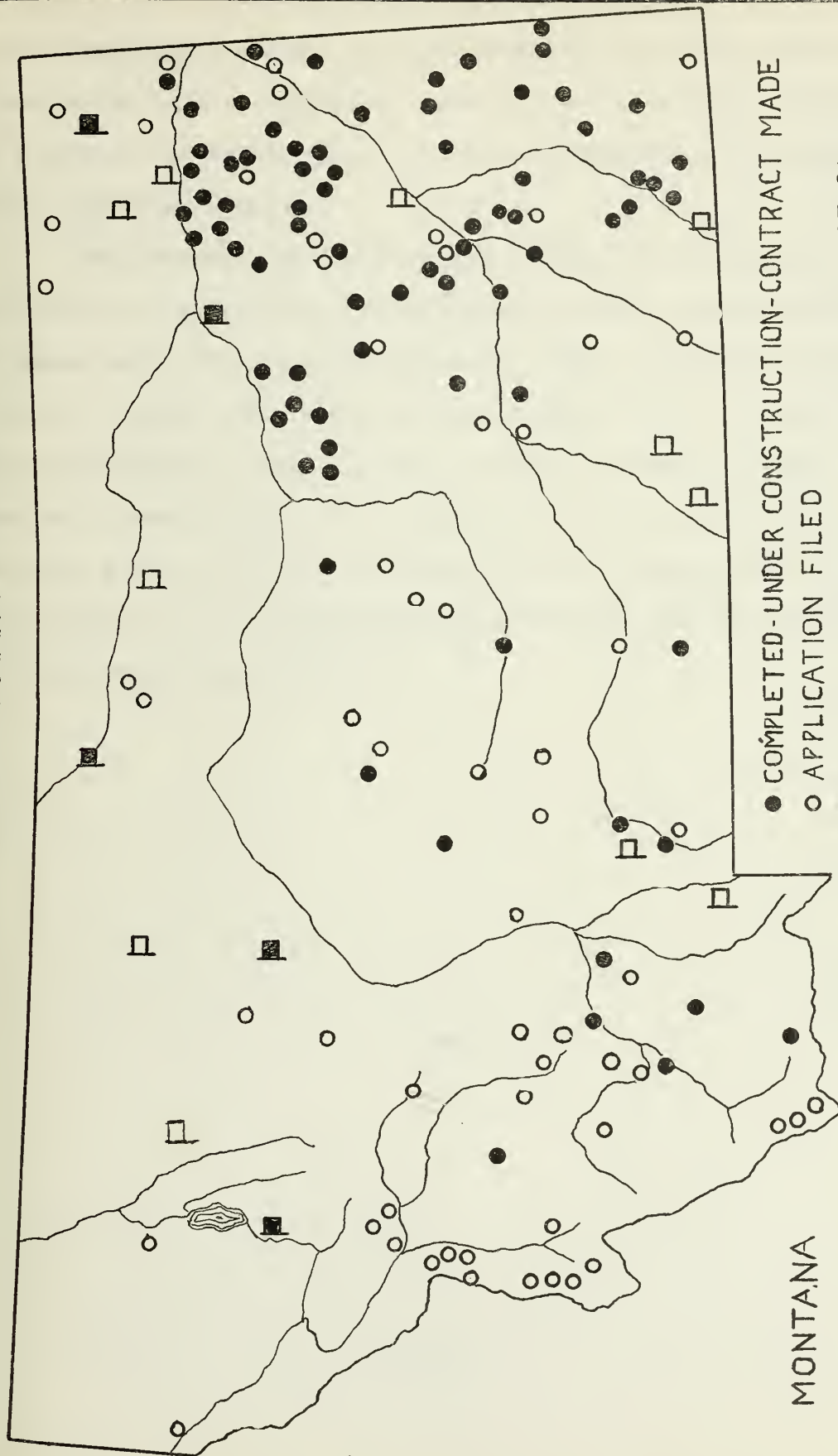
MONTANA

MONTANA STATE PLANNING BOARD

12/13/36 W. E.



# WATER CONSERVATION PROJECTS PRESENT PROGRAM



MONTANA

MONTANA STATE PLANNING BOARD

THURBER'S, HELENA



\$3,844,724. These will result in the addition of 246,861 acre feet of water to the present usable supply. If a permanent policy of Public Works is adopted by the National Government, there will be opportunity to expand this program as the conservation of our natural resources is the Public Work most needed in Montana.

The Board has also received help from the W. P. A. in the construction of the Valentine Project in Fergus County, now completed and the Deadman Basin Project on the Musselshell River. The Deadman Basin Project when complete will store 80,000 acre feet of water and stabilize the lower Musselshell Valley. Sixty-four smaller projects are under construction in Eastern Montana for irrigation and many more for stock water reservoirs, all as a part of the drought relief and rehabilitation program of the W. P. A. the Resettlement Administration, the Soil Conservation Service and other similar agencies.

Table showing, by watersheds, the irrigated and irrigable areas in Montana

District	Total	Area in acres		Additional Irrigable
		Irrigated		
Missouri above Hauser Lake	9,256,350	612,000		425,000
Missouri-Hauser Lake to Fort Benton	5,165,152	95,500		265,000
Missouri-Fort Benton to N. Dakota Line	18,400,000	59,250		270,000
Marías River Basin	4,538,968	108,000		445,000
Musselshell River Basin	4,633,240	57,500		110,500
Milk River Basin	9,965,872	112,500		172,000
Yellowstone above Billings	5,727,720	270,000		205,000
Yellowstone-Billings to Miles City	9,003,500	128,000		95,000
Yellowstone-Miles City to N. Dakota Line	7,030,480	33,950		152,000
Big Horn River Basin	1,190,000	25,000		303,000
Little Missouri River Basin	1,685,720	1,500		20,000
Clark's Fork Basin	13,702,498	226,000		500,000
Kootenai River Basin	2,169,360	4,000		50,000
	93,412,320	1,318,200		3,919,500

Table showing, by water-sheds, the irrigation needs and available water supply for Montana

District	Needs - acre feet			Supply Acre Feet	Surplus Acre Feet	Shortage Acre Feet
	Supple- mental Supply	New Land	Total Need			
Missouri above Hauser Lake	272,000	850,000	1,122,000	2,350,900	2,238,900	
Missouri-Hauser Lake to Fort Benton	25,000	570,000	555,000	4,067,000	4,112,000	
Missouri-Fort Benton to N. Dakota Line	25,000	540,000	565,000	5,014,395	4,449,395	
Marías River Basin		890,000	890,000	667,676		222,327
Musselshell River Basin	50,000	521,000	271,000	61,058		209,942
Milk River Basin	100,000	244,000	444,000	521,426	77,436	
Yellowstone above Billings	100,000	1,810,000	1,910,000	4,077,480	2,167,480	
Yellowstone-Billings to Miles City	25,000	120,000	215,000	6,106,000	5,895,000	
Yellowstone-Miles City to N. Dakota Line	10,000	218,000	228,000	3,312,760	3,385,760	
Big Horn River Basin	10,000	206,000	316,000	7,235,990	2,617,990	
Little Missouri River Basin	1,000	40,000	41,000	82,271	41,271	
Clark's Fork Basin	25,000	1,000,000	1,025,000	13,720,200	12,705,200	
Kootenai River Basin	None	100,000	100,000	8,153,300	3,050,700	
	643,000	7,436,000	8,082,000			

Total supply for each district is figured after all water needed for supplemental supply and new irrigable land has been satisfied with a return flow of 50% of all water used. Duty figured at 2 acre feet per acre for new land.

## POWER RESOURCES

Montana has enormous natural resources for the production of power. These consist of both hydro-electric power and the production of power from the fuels such as coal, oil and gas. The water power has been developed to a considerable extent, but the use of fuel for power production except as to gas has as yet been developed in only a small way.

For industries which require large amounts of power and dependable continuous operation the tendency has been to meet their needs from large systems with several sources of supply. In the larger centers of industry this tendency has favored the small user of power giving him access to a relatively cheap supply without the expense of installing a plant and operating it. These conditions have favored the large hydro-electric installations and the connected systems.

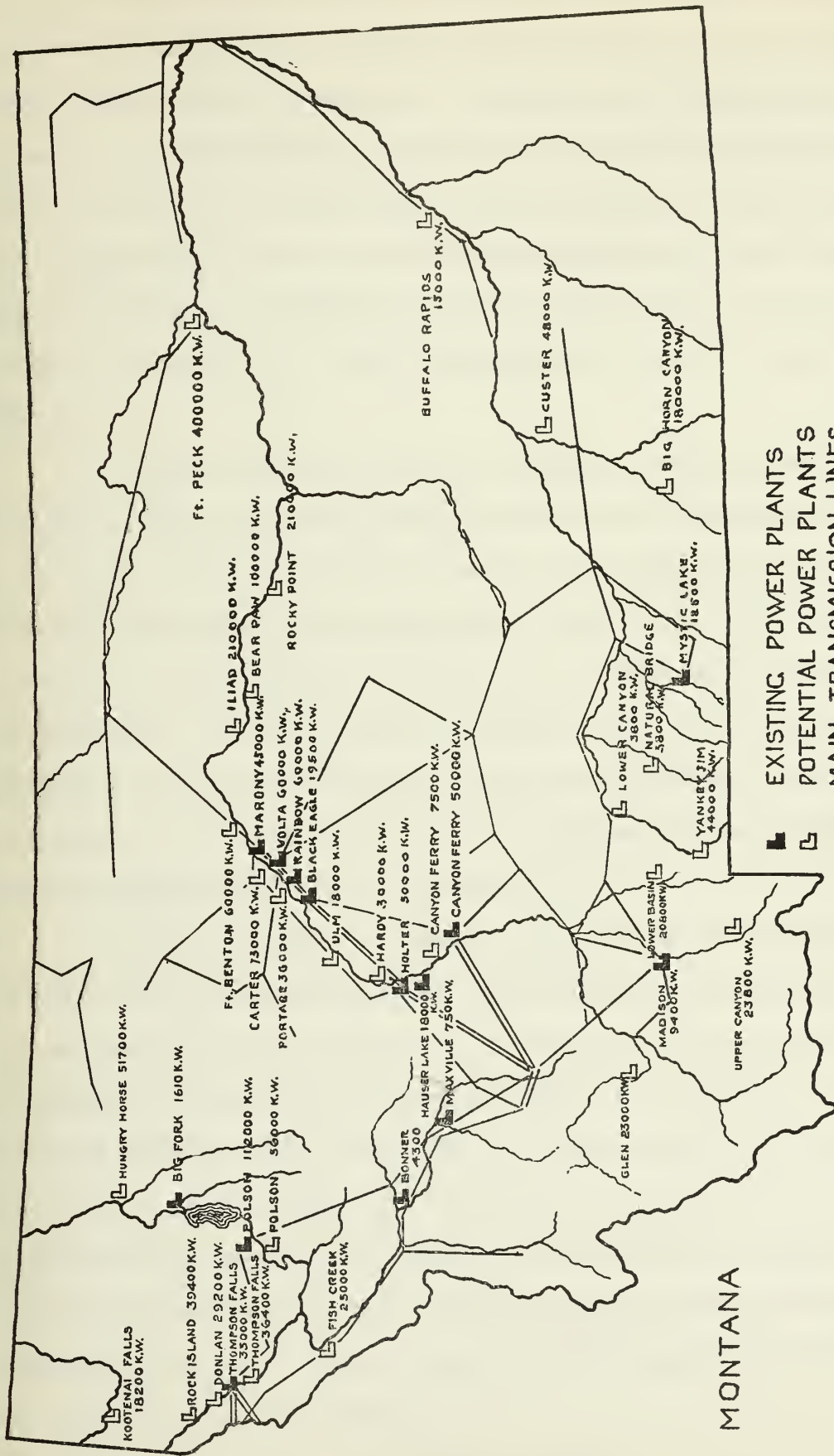
For isolated locations, where the amount of power used is small there has developed the use of coal, diesel and gasoline power owing to the cost of construction and up-keep of connecting power lines.

The small hydro-electric installations have generally proved expensive in operation. This is especially true of installations on the smaller streams with the added difficulty of continuous operation in sub-zero weather with a small and undependable water supply. Where continuous operation is necessary to keep costs at a reasonable figure as in mining and manufacturing, they have been abandoned in favor of other sources of supply. Some towns in western Montana are holding their small plants for standby power in case of failure of their transmission lines.

### Water Power

The development of water power by the large systems has in general, kept abreast of the market and most of the time they have been able to supply the demand and have foreseen and provided for future requirements. However, during the drought years on account of low water, there has been a shortage of power which has kept down production and increased unemployment.

# INSTALLED AND POTENTIAL HYDRO-ELECTRIC POWER PLANTS



■ EXISTING POWER PLANTS  
 □ POTENTIAL POWER PLANTS  
 — MAIN TRANSMISSION LINES

MONTANA



There is now developed and operating in the state a total installed capacity of 299,110 K.W. in plants of over 1,000 K.W. capacity, most of these being interconnected. 247,600 K. W. of this power is developed along the Missouri and Madison Rivers with 39,010 K.W. on the Clark Fork of the Columbia River and one plant at Mystic Lake, capacity 12,500 K. W. which is tributary to the Yellowstone. There is also under construction at the present time a plant at Polson on the Flathead River which will have an initial installed capacity of 112,000 K. W. All of these plants are in the western half of the state.

The Army Engineers have made surveys of hydro-electric power sites for the Missouri, Yellowstone and Clark Fork of the Columbia River and have listed power sites along these streams and their tributaries which are capable of developing two and one-quarter million K. W. of electric power including all sites having a production cost of less than 16 mills per kilowatt-hour. Over one million kilowatts of this can be built to furnish power at a cost of less than five mills per kilowatt-hour. These last sites are capable of being developed on a commercial basis under present conditions when the market can use their production.

The present market for power is very largely with the mining industry and railroad electrification, both of which are concentrated in the mountainous regions of the state and hydro-electric development has necessarily been concentrated as near the market as possible. In the future there is the opportunity of developing the power market in the eastern half of the state through pumping for irrigation, but power rates must be made sufficiently low so that the irrigated land can carry the expense. Up to the present time the rates for this work have been based almost entirely on the commercial rate and to create a large dependable market will require an adjustment to meet the conditions.

#### Power from Coal

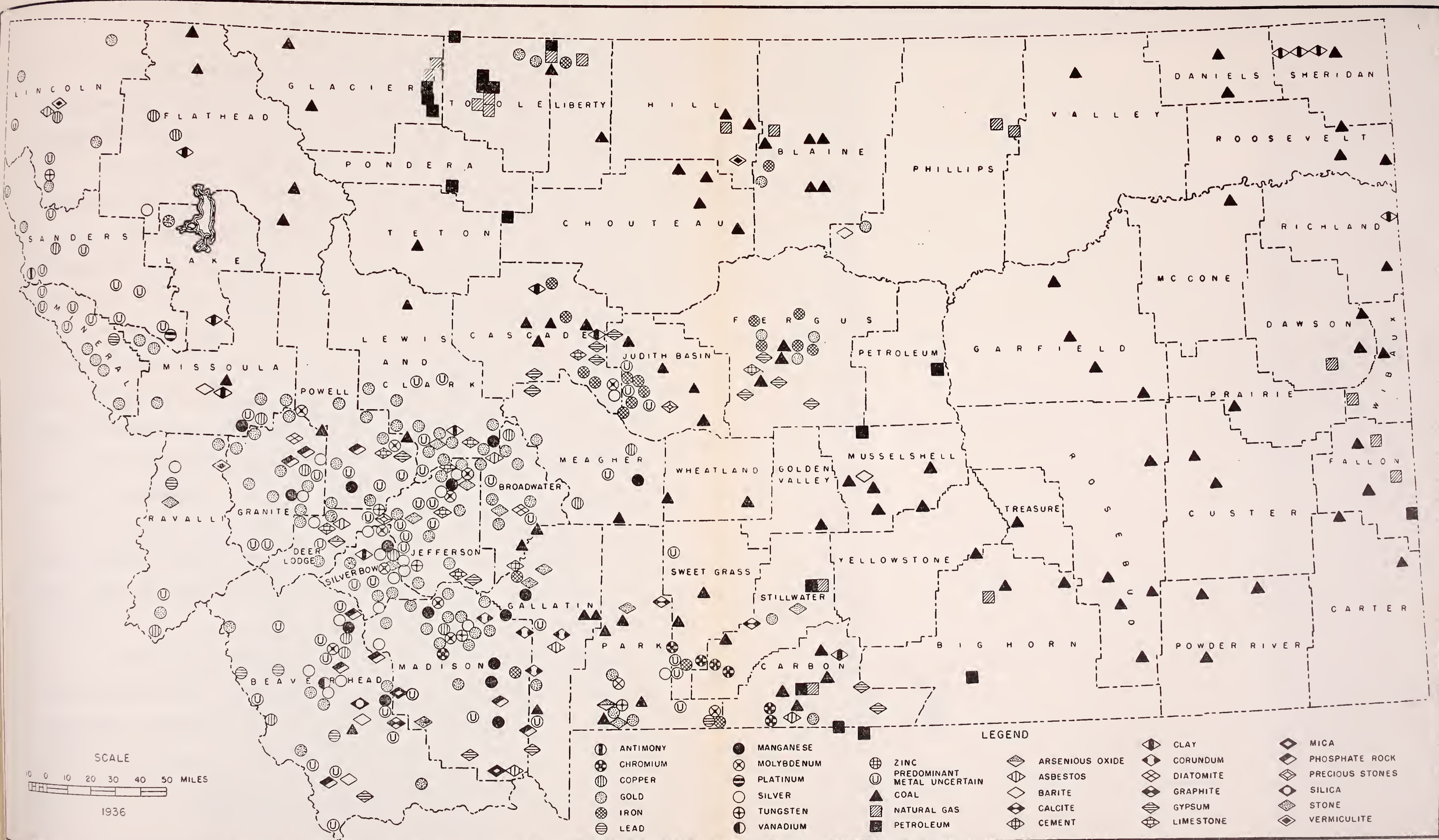
Montana has an estimated reserve of four hundred, ten billion tons of

coal and lignite which is  $11\frac{1}{2}\%$  of the total reserve of the United States. Of this reserve three hundred eighty billion tons are classed as lignite and thirty billion as bituminous coal. The lignite has the advantage of lying close to the surface in almost horizontal beds and with widths running up to twenty-five feet or more. It is therefore very cheaply mined and the Northern Pacific Railway Company is now securing their supply of fuel from a mine in eastern Montana by stripping and steam shovel mining.

For the production of power this coal will furnish a cheaper source than water power in all except the more favored locations. The Army Engineers have estimated the cost of production of electric power with coal in Montana at eight mills per kilowatt-hour, but there is no doubt but that it can be done much below this figure. This Montana lignite has never been tested on a large scale for the generation of power, but it has been proven to be of sufficiently good quality for locomotive use. This enormous coal reserve would be sufficient to furnish all the power needed in Montana at double the present rate of use for thousands of years.

Montana produces petroleum and natural gas. In the eastern part of the state where there is a sufficient supply, natural gas is extensively used for power production through steam engines and furnishes the cheapest source available.

For small, isolated plants there has been a wide spread development of Diesel engine power using a cheap oil as fuel. The use of gasoline and distillate engines - mainly automobile engines - has a wide-spread use for small units where the higher cost of fuel is off-set by its convenience. The oil fuels are easily and cheaply transported and are favored in situations which are remote from rail transportation.



**MAP OF MONTANA SHOWING AREAL DISTRIBUTION OF MINERAL RESOURCES.**  
 COMPILED BY MONTANA BUREAU OF MINES AND GEOLOGY AND MINERAL RESOURCES DIVISION OF STATE PLANNING BOARD  
 BUTTE, MONTANA



## MINERAL RESOURCES

### Importance of Mining

The first permanent white settlement in the state of Montana was occasioned by the discovery of placer gold and ever since that time the mining industry has been one of the major basic industries of the state.

In 1862 the discovery of rich placers at Bannack, followed by the subsequent discoveries in Alder Gulch, Last Chance Gulch and the territory surrounding Helena, Silver Bow Gulch and others, caused a large immigration of white settlers, who began the real development of Montana. The subsequent discovery of silver mines of Butte, Phillipsburg and Granite and Neihart, the gold veins of Unionville, Marysville and Zortman, the lead mines at Hecla and Witches, together with an immense development of copper ores at Butte, rapidly placed the territory in position for state-hood. During these years, up to 1890, mining was the largest industry of the state, and its main support. The subsequent development of the states resources of zinc, coal, oil and gas have constantly increased the income of our people.

At present there are about 25,000 employees directly engaged in the mineral industry which, with their various and subsidiary employment in lumber camps, farms and service occupations, support about one-third of the total population.

During the period from 1862 to 1931 inclusive, the state has produced about \$3,000,000,000 in value of mineral products of which over one-half has been copper. The production even for the depression year 1935 as shown in the following table was a major source of income to the state.

Metal -----	\$28,389,000
Non-metal -----	1,320,000
Coal -----	4,349,000
Gas -----	728,000
Oil -----	<u>5,763,000</u>
Total ----	\$40,619,000

Metal mining is confined to the mountainous areas, which are principally in the western and southern portions of the state, but coal occurs in 90% of the counties, with the largest deposits in eastern Montana, while oil and gas come from fifteen separate fields widely scattered throughout the plains area. There are unlimited amounts of cement material, building stone, sand and gravel available in most parts of the state.

### Production

The outstanding mineral product is copper. The state has produced over 10,000,000,000 pounds of copper with a value of more than \$1,500,000,000. Most of this production has come from the Butte district and it is still producing at almost its maximum rate for the period. The mines have reached a depth of 4,000 feet below the surface and their normal life will extend over many additional years. The treatment for these ores is carried on in the smelters at Anaconda and Great Falls, together with the production of zinc, silver, gold, arsenic, and sulphuric acid, which are all contained in the Butte ores.

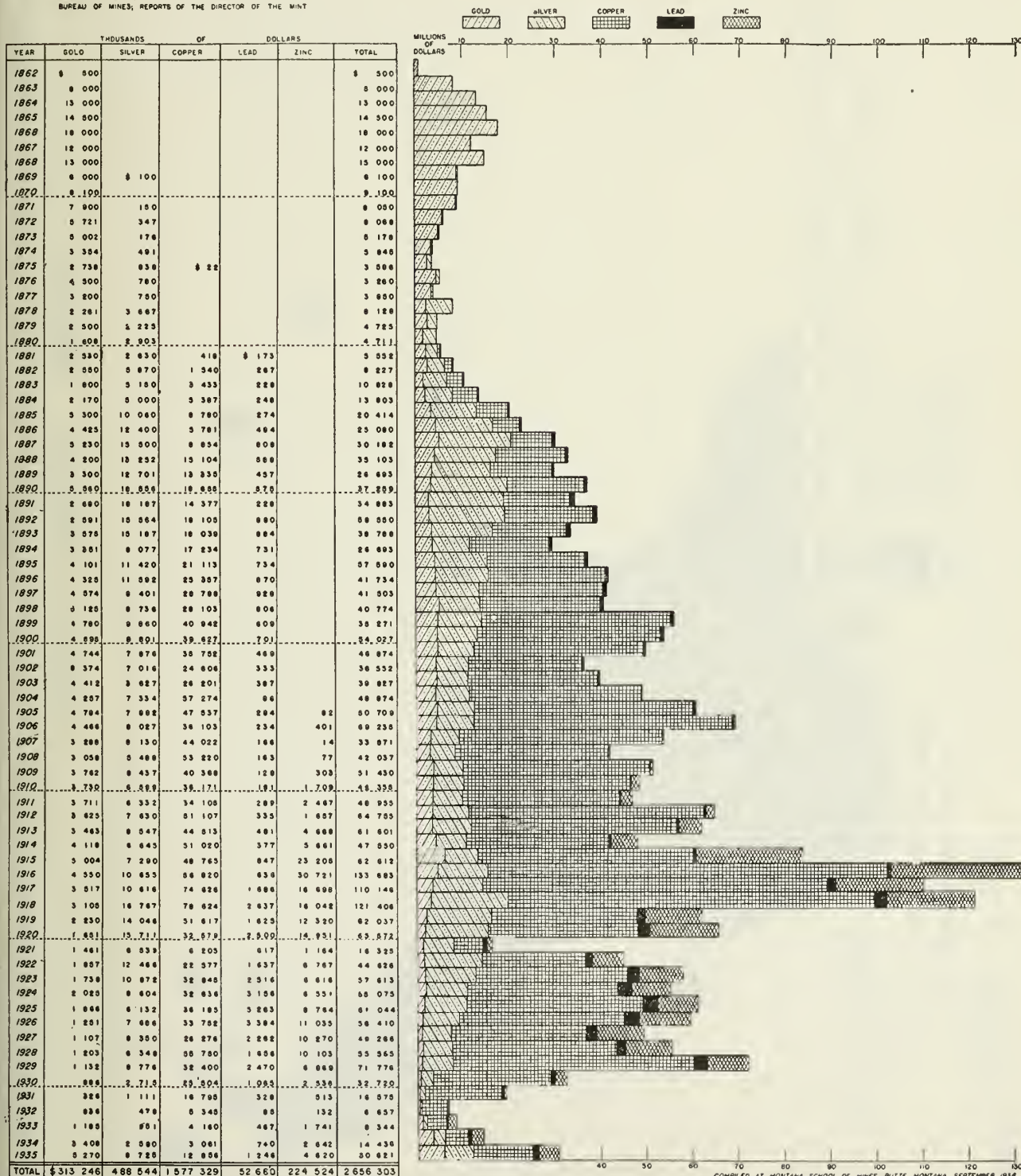
Silver mining began in Montana in 1865, and the production of this metal since that time has amounted to about \$500,000,000. This product has been concentrated largely in the mines of Butte, Phillipsburg, Granite and Neihart, with additional production from practically all of the lead, zinc and copper mines of western Montana. Silver is still an important metal in increasing the value of the ores mined in all of these camps.

The production of gold in the past, has been from the enormously rich placers of Bannack, Virginia City and Helena, but there have been important additions to the gold production from the quartz mines of Marysville, Zortman and other camps, as well as from the silver, lead, copper and zinc ores of the state. The production of gold is now increasing due to the mining ores in which gold is the principal value, and from the development of large scale mining of placer deposits by machinery. The principal reason for this increase has been

# METAL PRODUCTION

## OF MONTANA 1862 - 1935

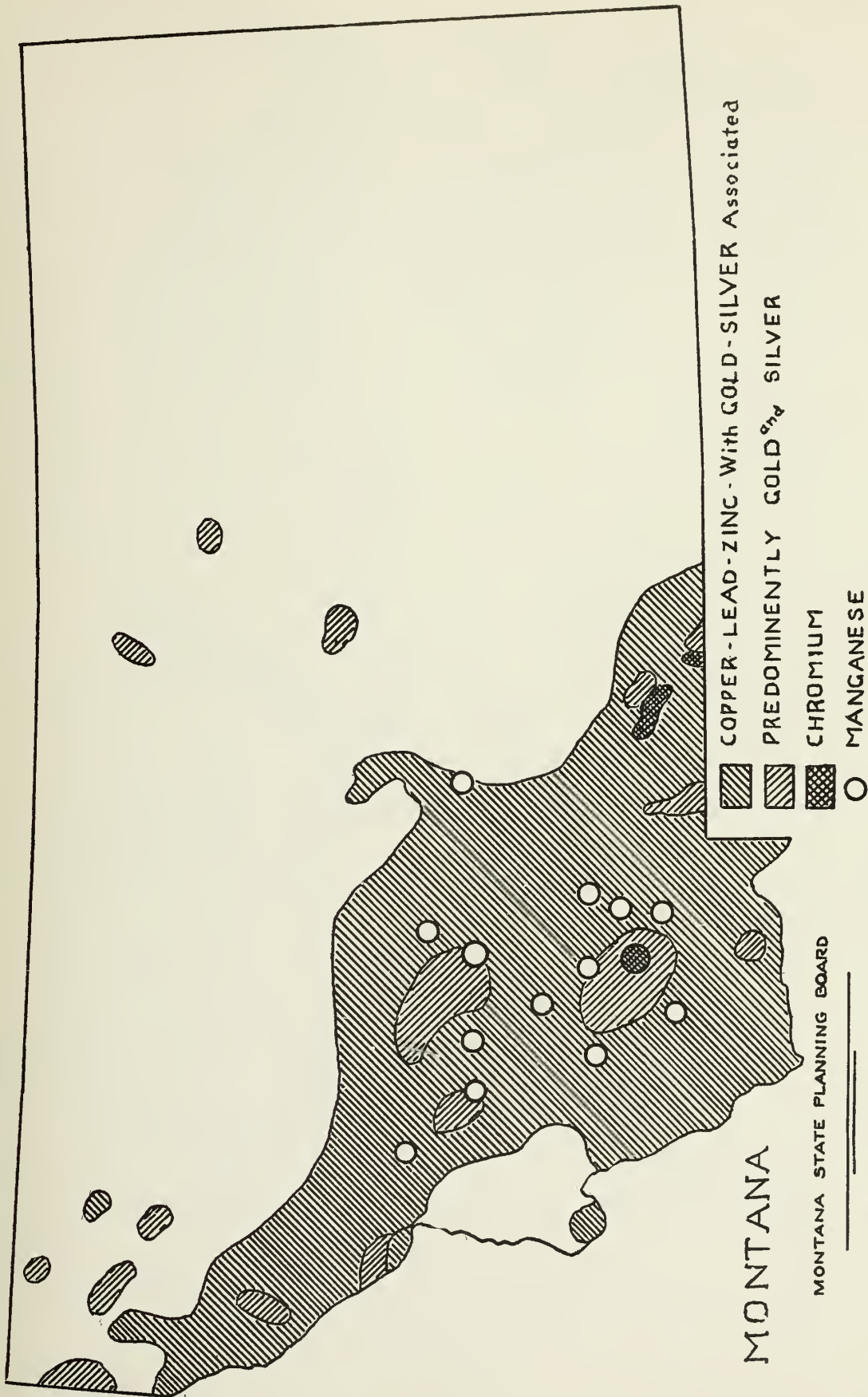
SOURCE: ESTIMATE OF MONTANA BUREAU OF MINES AND GEOLOGY (1862-1881);  
MINERAL RESOURCES, UNITED STATES GEOLOGICAL SURVEY AND  
BUREAU OF MINES; REPORTS OF THE DIRECTOR OF THE MINT



COMPILED AT MONTANA SCHOOL OF MINES, BUTTE, MONTANA, SEPTEMBER 1936  
BY F. C. GILBERT, ENGINEER IN CHARGE, MINERAL INVENTORY OF MONTANA  
F. V. HUNTALL, DRAFTSMAN



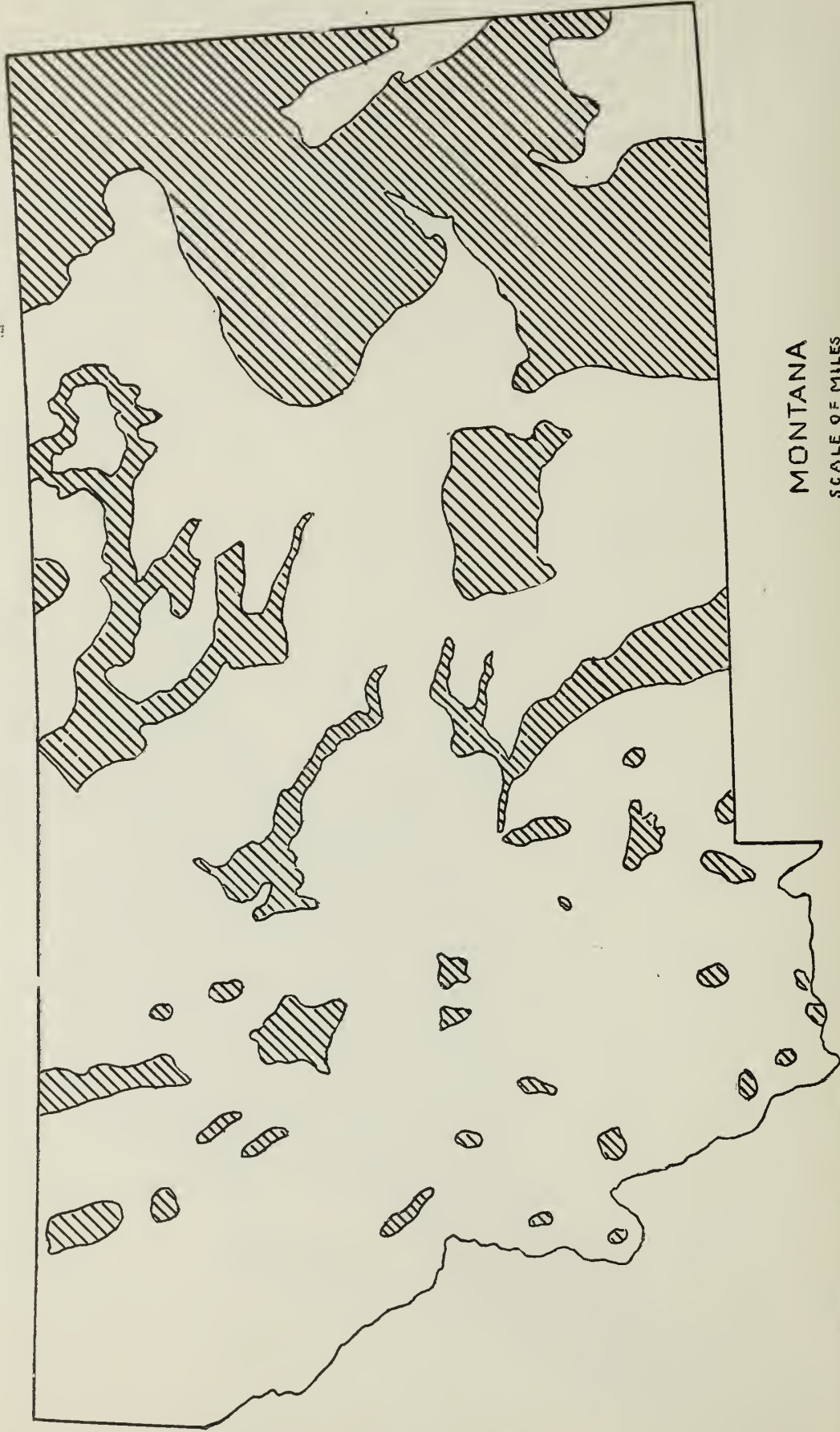
# METAL MINING AREAS







KNOWN COAL AREAS



MONTANA

SCALE OF MILES



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the rise in the price of gold from \$20.67 per ounce to \$35.00 per ounce.

Zinc has been an important metal product, since the discovery of a successful electrolytic process of extraction. It is produced principally from the mines at Butte.

In early days lead was an important product of Montana and the silver-lead mines of Wickes, Hocla and other camps became important as early as 1880. Of later years the production has been small and mostly as a by-product in the mining of other metals.

Manganese ore has been produced principally in Phillipsburg and Butte and at present Montana produces almost all of the manganese ore mined in the United States.

There are large reserves of chromium ores in the Bear Tooth Mountains north and east of Yellowstone Park. These ores will eventually furnish a sufficient supply of this metal for our national needs.

#### Non-Metallics

Coal is the largest non-metallic mineral resource of the state. Montana has 11 $\frac{1}{2}$ % of the coal and lignite resources of the nation and a large proportion of this lies near the surface and can be easily and cheaply mined. The total known reserve is figured at about 410,000,000,000 tons and it is valuable for use as fuel, for the production of power or any other purpose for which coal may be used, when the demand arises.

Petroleum is produced in many fields in the plains area of Montana and the annual production was \$5,750,000 in 1935. Active development is under way in the various oil fields of the state and production will probably continue to increase.

Natural gas is produced on a large scale in at least three areas,

and is used as a fuel in Butte, Anaconda, Helena, Great Falls and other cities in west-central Montana, in Billings and surrounding territories in south-central Montana. It is used as a fuel and as a source of power in eastern Montana from Forsyth to the North Dakota line.

Phosphate rock is mined north of Garrison and used in the manufacture of fertilizer. There are large deposits in the territory from Garrison to Drummond, with an estimated reserve of almost 400,000,000 tons of phosphate rock in the state.

Of the lesser mineral products, Montana produces its own requirements of cement, clay products, building stone, sand and gravel and also produces sapphires in Yogo Gulch and in Rock Creek in Granite County. In addition Montana mines ship vermiculite which is used for heat, sound and electric insulation and other purposes.

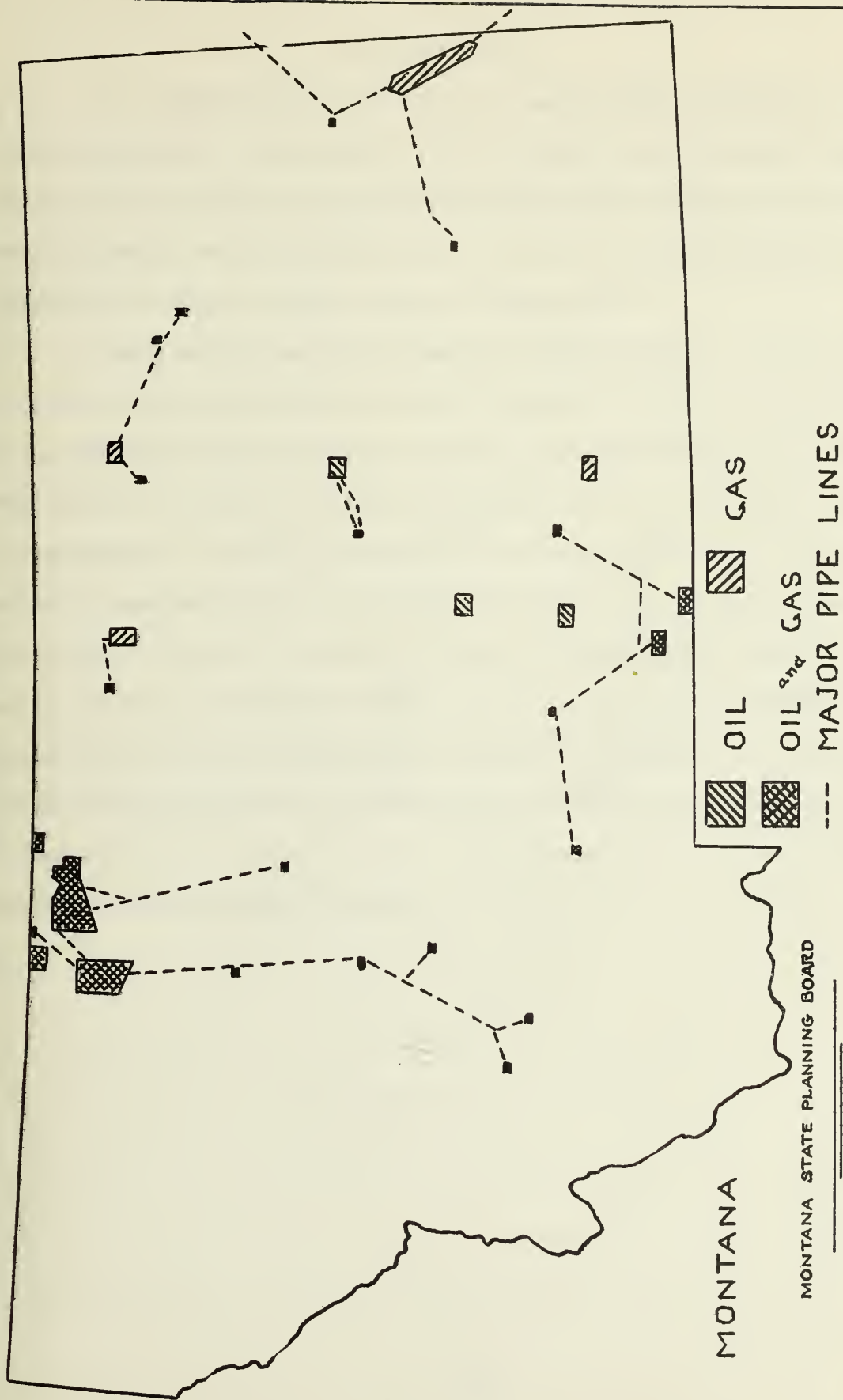
#### Future Developments

The future of the mineral industry in Montana is bright. The Public Works construction necessary for the rehabilitation of the farm population together with a return to normal business conditions throughout the nation will create an increased demand for mineral products. Metal production will be stimulated by higher prices and the reduced smelting rates put into effect during the last few years. New products such as Chromium and Titanium with increased production of Manganese, Tungsten, Graphite, Petroleum and Natural Gas will furnish employment for a large percentage of our population. Montana has been blessed with unusual resources of metals and fuels and the enterprise and industry of our citizens will assure their early development.

#### Aid to Mining Industry

The development of mineral deposits and the operation of mining properties is so largely a matter of individual judgement and personal supervision that the mining industry, in so far as it has been successful, has always been an individual business.

# OIL & GAS FIELDS



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It is difficult for the state to render direct assistance to an industry operating in this manner. It can however, supply general information and advise as to what has been done and what has been published in regard to mining districts and individual mines. It can also assist indirectly by the improvement of roads and other means of communication.

The Planning Board in cooperation with the School of Mines and the U. S. Forest Service has assisted in the location and survey of roads to mining districts, especially those districts in which there are a number of small operators or where the mining properties are in the earlier stages of development. It has also assisted in the inventory of mining districts and metal deposits carried on through WPA personnel and directly supervised by the School of Mines. The School of Mines has published a directory of mining properties and operators in the state and has made an extended investigation of the under ground water resources of Montana. It has appeared to the Planning Board that by such measures as these a real assistance could be rendered to the industry and both time and money thereby saved in the development of our mineral resources.

## Forest Resources

Montana's annual rate of tree growth is small in comparison with other forest sections which have heavier rain fall and warmer weather. This means that the growing of commercial sized timber in Montana takes a much longer time than in our competitive areas, probably a minimum of seventy-five years, and therefore, reforestation is much more expensive than in other timber regions.

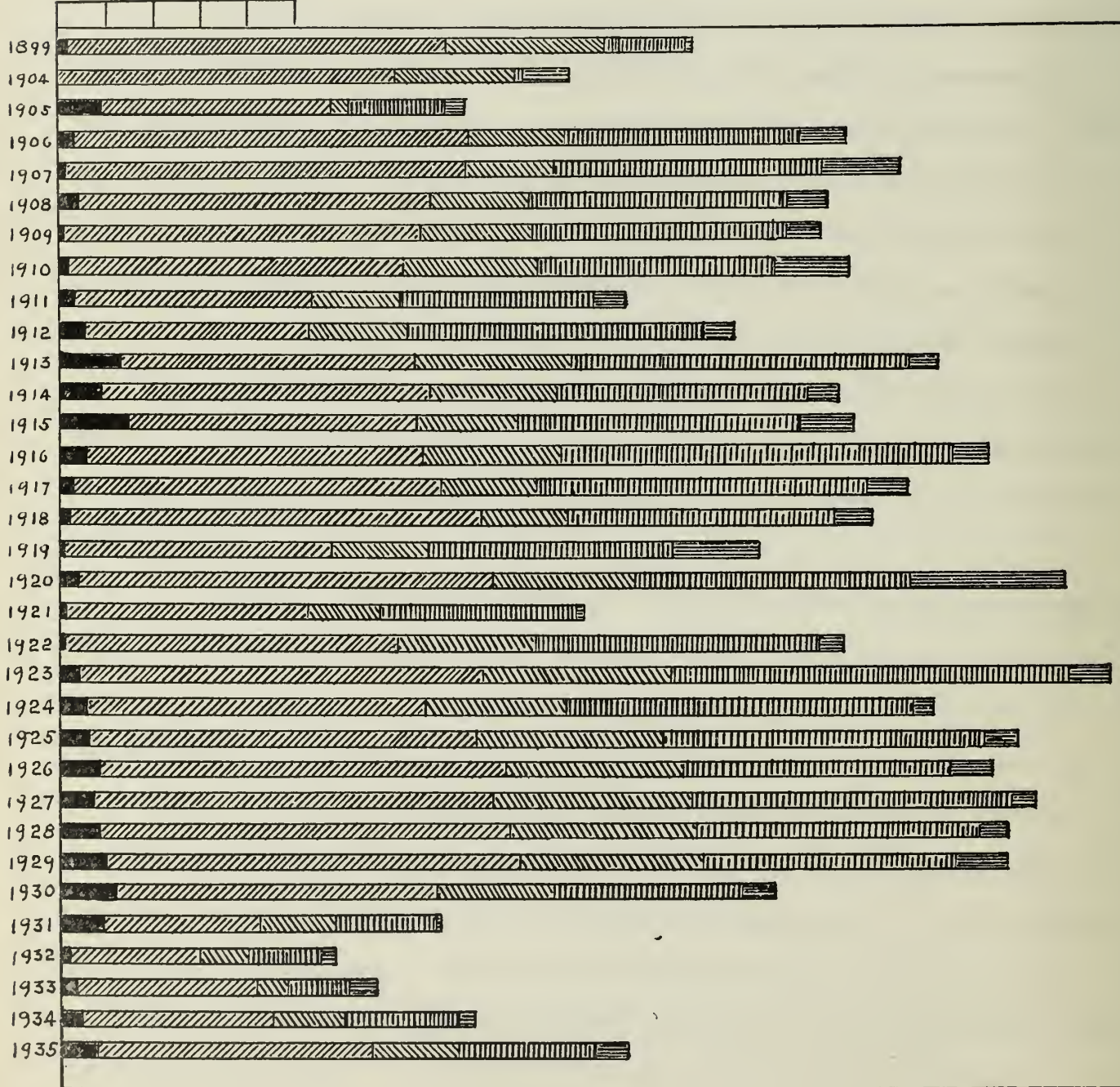
We must retain and conserve our forests in order to protect our water sheds and build up our soils. To say nothing of their value in perpetuating the lumber industry and maintaining our very valuable recreational areas. Also it is to the interest of all users of forest products that they obtain their lumber, mill work, mining timbers, fence posts and poles, wood fuel, etc. at a reasonable cost. So long as we are able to produce our lumber requirements from our own immediate forest areas, we are assured that the outside producer will meet competition which means that the Montana consumer will not be at the mercy of a non-competitive market. Farm needs will always require a large amount of forest products, as substitutes do not replace rural lumber needs as they do in the cities.

Montana's forest area comprises some 20,700,000 acres with an estimated stand of some 45,000,000,000 feet of timber. There is an average of about five thousand feet per acre in the commercial timber stand areas as against 45,000 feet per acre for similar areas on the Pacific Coast west of the Cascades. In other words, there is nine times as much growing timber to an acre in the fir region with its heavy rains as against the same area in this state with its low temperatures and low precipitation. The rate of re-production of forest growth is in about the same ratio. Does this condition not make us aware of the fact that there exists an urgent need to protect and conserve the timbered areas which are still left to us?



# LUMBER PRODUCTION MONTANA

.6"=20 MILLION B.M.



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# LUMBER PRODUCTION MONTANA

YEAR	IDAHO WHITEPINE M ft. B.M.	PONDEROSA PINE M ft. B.M.	DOUGLAS FIR M ft. B.M.	WESTERN LARCH M ft. B.M.	ALL OTHERS M ft. B.M.
1899	4,375	153,467	61,931	34,197	415
1904	—	138,476	49,404	3,400	17,900
1905	20,561	101,998	6,132	39,089	8,155
1906	5,850	165,849	41,537	91,488	19,119
1907	2,615	164,746	34,703	107,684	34,066
1908	6,287	144,587	38,825	106,095	15,729
1909	1,671	146,890	43,270	104,130	12,621
1910	3,090	135,817	53,070	99,283	27,829
1911	5,311	96,654	36,784	80,145	9,522
1912	7,363	94,093	39,325	120,779	10,614
1913	24,606	120,414	63,393	137,703	11,757
1914	17,537	134,568	51,061	101,771	12,905
1915	27,330	118,920	41,464	115,001	21,618
1916	10,497	138,206	56,845	163,829	14,507
1917	4,974	150,905	38,600	135,734	17,283
1918	4,207	169,956	34,906	114,250	12,492
1919	371	108,548	40,675	101,714	36,070
1920	5,066	173,736	55,968	112,447	63,149
1921	710	102,342	27,768	81,053	2,122
1922	351	136,574	52,434	105,486	9,538
1923	7,539	167,632	76,433	159,031	16,999
1924	9,484	137,650	54,598	141,093	8,577
1925	9,915	159,454	74,335	133,424	12,487
1926	15,218	172,295	67,641	112,248	12,161
1927	12,626	164,597	80,172	130,671	9,036
1928	18,513	168,776	73,315	118,235	10,113
1929	21,699	170,299	73,235	104,900	19,501
1930	25,602	134,218	46,105	77,950	14,460
1931	17,857	64,909	30,005	41,883	4,837
1932	2,705	55,275	16,294	32,700	5,258
1933	4,701	72,534	14,409	24,624	10,310
1934	7,092	80,044	27,074	50,366	8,748
1935	15,408	114,942	34,684	56,476	13,778

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Due to depressed business conditions and the higher cost of manufacture in Montana, practically all of the small saw-mill operators have been eliminated; leaving but a few large operators cutting practically all the lumber now produced in this state. Even with this latter condition existing, the total production has only dropped about 40% from the peak production year. The Forest Service estimates that at the present rate of cutting by the existing mills, Montana can go on a sustained-yield cutting basis. This means that the annual rate of growth of the existing forest is sufficient to replace the timber now being cut by our present saw mill operators, provided the forests are properly protected from fire, insect depredation, tree disease, and approved cutting and logging methods followed as outlined by the lumber code. This is an enviable situation which we should make every effort to maintain.

Of the 20,700,000 acres, roughly speaking, private owners control 4,100,000 acres; national forests 13,400,000 acres; and other public agencies, including the state and county, 3,200,000 acres. However, the total estimated timber is divided as follows: privately-owned 11,800,000,000 feet; national forest, 26,500,000,000 feet; other public agencies, 6,900,000,000 feet.

Of the 20,700,000 acres-forested area, 7,400,000 acres is classified as commercial timber; 7,200,000 acres is second growth, which if properly protected will ultimately become commercial size; 5,400,000 acres is non-commercial area primarily valuable for water shed protection, grazing and wild life conservation; 700,000 acres is cut over and burned having little or no present value.

Of our 45,200,000,000 feet of timber, 9,000,000,000 is Ponderosa pine, 1,200,000,000 western pine and 35,000,000,000 fir, spruce, lodge pole, balsam, etc. The western white pine is the most valuable species but we have but about 2% of

this valuable timber in our total stand. Ponderosa, or yeellow pine, is our next most valuable specied producing lumber and representing 20% of our total stand. The remainder, or 78%, represents species which while producing good lumber fails to yield a profit to the operator; especially when market conditions are no better than in the past seven years.

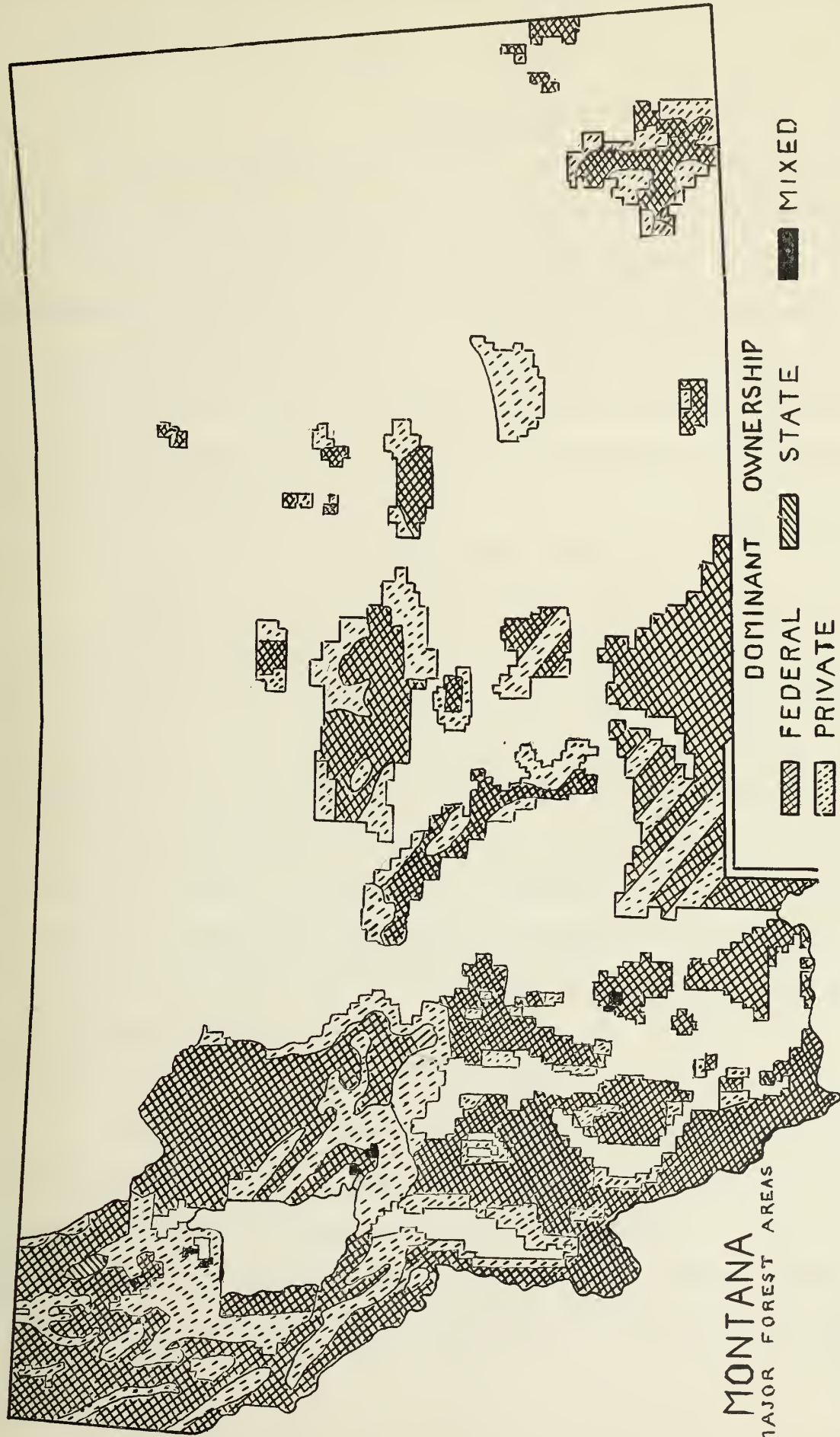
From 1925 to the present time, the loss of timber due to fire, insect depredation and disease, has been greater each year than the total cut for commercial use. This is a startling fact which should give us pause.

#### National Forests

The national forests are managed under established policies intended to provide the best multiple-use of the land and its resources, including timber, watershed protection, grazing and recreation. Protection against fire, insects and disease, together with continuous re-forestation is the major objective at this time. The national forest areas generally speaking, do not include the best type of forest lands, but are located in the rougher mountain areas or in in-accessable regions making them primarily valuable for water shed protection, grazing and recreational use. The value of the national forests in relation to its commercial-timber production is quite generally misunderstood.

#### Public Domain

The forested public domain remains with little or no provisions for protection, development, administration or plans for permanent use of its forest resources. This fact is a severe indictment against the government which has pursued and allowed such a policy to continue.



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12/10/36

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THURBER'S, HELENA



### Indian Lands

Forests within the boundaries of the Indian reservation are on either allotted or tribal lands. The pressure is always strong to liquidate this resource for the temporary benefit accruing to the Indian. However, this pressure comes from outside private interests and does not represent the policy of the Indian department. Trained foresters are at present employed and cutting practices are good. The general trend is toward a sound conservation policy. The principle of sustained yield is recognized and the tendencies are toward a strict observation of the same.

### State Forest Lands

Montana state forest lands have been largely held intact. By wise legislation, the state was enabled some years ago to exchange lands with other agencies and block state holdings in such a manner as to reduce administrative costs and assure better protection against fire and insect hazards. State timber is sold at its full appraised value subject to a minimum price established by law. Legislation requiring slash disposal and silvicultural requirements on state timber sales are satisfactory. There is, however, the continued danger to the forest from pressure for excessive liquidation in order to obtain funds for state school purpose. This is a very dangerous policy for the future welfare of state forests.

### County Lands

The acquisition of cut-over or logged-off lands by counties, through tax delinquency, is rapidly increasing. The present private owners have no incentive to retain ownership. Practically all of this type of land has proved, by sad experience, to be primarily valuable only for forest purposes. Present tax methods prevent owners placing these lands to their best use, reforestation,

The only recourse left is for the owner to allow the lands to become tax delinquent, falling into eventual county ownership.

Counties have neither the required finances nor the will to give these lands proper protection or administrative attention. Their efforts are limited to selling them and restoring to the tax rolls what small portion can be sold for farm, range or other purposes. Strictly a land promotion policy that only spells eventual disaster. These county-owned and tax-delinquent cut-over lands are the real forest problem areas. They are fast becoming a menace to adjoining timber areas. They are in the high fire-hazard class. They lack any protective measures. Counties must either create control measures or dispose of them to state and federal ownership where they will be placed under sound management, eventually creating a source of income to the counties. They are only a liability at this time, both to the county and to all adjoining areas.

#### Private Lands

Private-owned forest lands comprise the better quality of forest areas. Their relative importance is out of proportion to the area, in so far as commercial timber production is concerned.

Present tax methods and economic conditions force the private timber holder to a policy of rapid liquidation of his raw material, the forest. Sustained yield policies allowing a permanent lumber industry are impossible unless there is created government long-time credit together with adjusted tax methods and state and federal government assistance in fire and insect protection.

There are a number of private-owner protective associations now furnishing satisfactory fire protection to the forested lands of members of the respective associations. Revenue for protection is raised by association assessments against the individual owners. Little or no insect and disease

control is practiced. So far as economic conditions will allow, cutting practices are sound in private logging operation.

#### The Plains Area

Montana requires a long time program of tree planting in the Plains section of the state. To be used as wind-break areas which eventually will become valuable to conserve water, restrain rapid run-off, prevent wind erosion of the soil, reduce evaporation, afford protection to wild game and domestic livestock and materially add to the more comfortable home life on our prairie lands.

Can we afford to neglect forest conservation? Private lumber industry is willing but financially unable to correct the wrongs. Are we willing to profit by the experience of the one-time forest regions of the New England states, the Great Lakes states and our western neighbors? There yet remains the time and the opportunity.

## FORESTRY PROBLEMS

By T. C. Spaulding, Dean of Forestry  
State University

The forests, and with the forests the resources flowing from their soils, are of primary value to the State of Montana. Agriculture, mining, forestry and recreation are the State's major industries, and with careful husbandry, agriculture, recreation and forestry will increase in value as the years roll on. Forestry, likewise agriculture, augments the value of its soils. Careful forest management means not only an increased production of wood and thereby more labor in its manufacture, but, also, conserves the moisture for irrigation and other water use, assists in preserving our farm soils, provides a home for our wild life, makes it possible to develop the recreational advantages of this State of ours, and furnishes a constant and perpetual pasturage for our domestic livestock. Forest soils may not only produce timber, but at the same time, and without interference, one with another, regulate our stream flow, furnish succulent forage for our livestock and our game, and happily because of our mountains and glaciers, and limpid lakes and streams, draw people from all over the world, that they, too, may vacation with us. What have the Alps that we do not have in Montana? Will Lakes Como or Garda be more beautiful than our own Flathead and its satellites, or our Fort Peck reservoir when it is framed with a forest border. In the old days, people came to us from all over the world to hunt. A little foresight, and with it constructive planning, may easily bring them back to us, to the financial advantage of the entire state.

The future success of Montana depends upon the planning of today. Everybody knows that. We cannot wait. If we do, other regions and other States will reap the advantages that should be ours.

Within the State of Montana are about 20,000,000 acres of forested soils that must be retained in forest cover that the State may secure the highest uses from those soils, i. e., wood, water, forage and recreation.

This is more than one-fifth the area of the state. The problem of securing the highest and most profitable use of these soils is not easy to solve, but it can be solved with the whole-hearted cooperation of the people of the state. The present forest area may be roughly divided into two classes of soil use:

1. Where growth conditions permit the production of timber for lumber and its by-products, i. e., maintain a permanent and sustained forest industry with its labor need.
2. Where slow growth or other conditions make the forests primarily of value for the protection of watersheds, and with this use, the production of timber for local supply, pasturage, recreation, wildlife and the many other benefits flowing from a forest cover.

To maintain a permanent Forest Resources Industry, we must:

- (a) Take immediate steps to stop the all too numerous and disastrous forest and range fires. Think of the fires in the Little Rockies and Fergus County this year.
- (b) Provide for means of exchange of forest soils, that the state, the federal government, the counties, and the private owner may block out their holdings in such measure as to permit of intensive management and protection.
- (c) Enact such legislation as will allow the state to take advantage of the very liberal federal statutes, enacted solely for the purposes indicated above.
- (d) See to it that the state, in cooperation with the federal government and other agencies, begins now to secure the basic data needed to put the forest resources industries on a permanent basis, that their economic importance may be not only assured, but increased in value. We need new industries in Montana. The forests may provide them, if we carefully plan and study.

Under both classes of forest cover, we have our water conservation.

Basically agriculture in Montana depends on irrigation. The forests conserve the moisture and regulate the stream flow. Barren slopes allow early snow melting, high spring floods and dry stream beds in July and August. A well-managed forest cover shades the ground, reduces high water levels and assists in providing all-summer irrigation. For the benefit of the agricultural industry, the state and federal government must maintain the forest cover on the

upper reaches of our streams. Careful and intelligent planning will not only save money, but make money for our people.

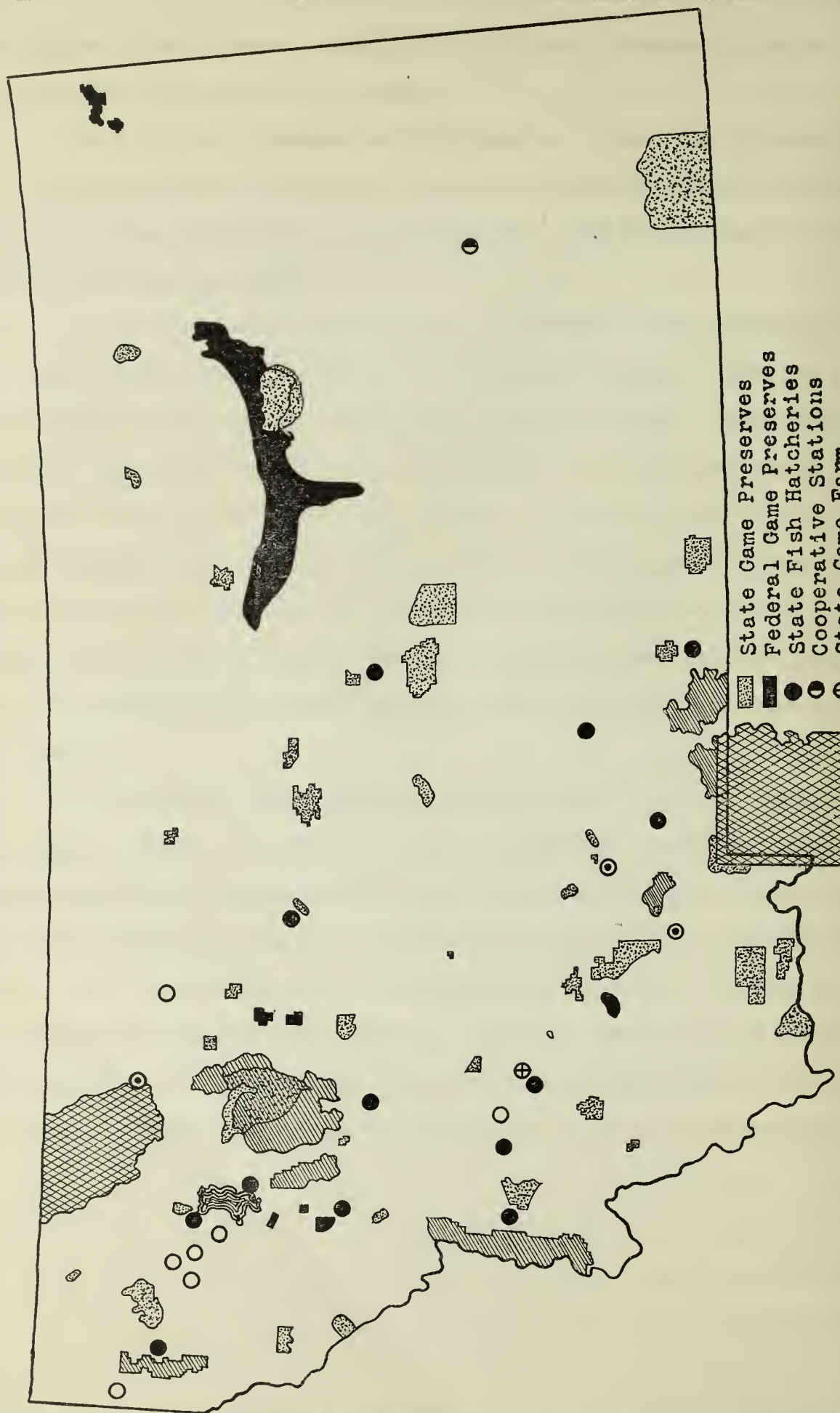
Every section of Montana has wild game and recreational opportunities, if we will but take advantage of the natural resources locally available. Forest and woodland plantations, on suitable areas, will allow community centers and the shelter for wild life.

One of the greatest difficulties of our eastern Montana farmer has been a lack of shelter for his home and his livestock. Only too often has this expression been used, "A cracker box on a bleak prairie." A shelterbelt around the farm home gives him shade in the summer and shelter from winter winds. The snow, so badly needed for the crop, is blown into the coulee. The June and July rains are evaporated from the soil by the too steady winds. Windbreaks, reducing wind velocity and consequently soil evaporation, may be a partial solution for his problem. The state should increase its activities, that both irrigation and dry land farming receive the unquestioned benefits of farm forestry.

The forest and forest resources problem enters into every phase of life within the state. Its planning and its program must provide for the sawmill or paper plant with a thousand workers, the rural community and its park, the stockman searching for succulent pasturage and permanent water holes, and the welfare of the farmer whose task is not too easy at the best. The state can do things beyond the power of the individual. Slapdash methods and wild exuberance wastes money. Carefully laid plans, based on sound knowledge, mean the greatest good for the greatest number, with the least waste of time, effort and money.



# RECREATIONAL AREAS



- State Game Preserves
- Federal Game Preserves
- State Fish Hatcheries
- Cooperative Stations
- State Game Farm
- Primitive Areas
- National Parks
- State Spawning Stations
- Federal Fish Hatcheries

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## RECREATIONAL RESOURCES

The recreational resources of Montana are an ever increasing asset to our people. The out-of-doors affords good healthy pleasure, in many forms, for all. In addition it is rapidly becoming of great commercial value to the state, producing an ever increasingly large revenue to our people from out-of-state sources.

With the advent of shorter-hour working days and consequent added time for leisure, recreation will become more and more important. We all realize that taking our vacation and leisure time in the out-of-doors is far better for us physically and mentally than time spent in-doors. America is awakening to the realization that the great Northwest is a wondergul recreational region. The construction of modern highways, improvement in rail equipment and safety in air transportation, allow America to travel in ease and comfort to the areas which they select for their vacation time. Montana has been highly favored by nature, providing us with majestic mountains, great forests, beautiful valleys, natural phenomena, wild game fishing streams par-excellence. In addition, we have a wealth of Indian and Pioneer history together with historical points of interest which will be of ever increasing attraction to our out-of-state neighbors. WE WILL BECOME THE SUMMER PLAYGROUND OF AMERICA.

## The Recreational Industry

Recreation as an industry and revenue producer for the people of Montana has taken its place, within the last few years, among the major industries of the state. In 1935, our gross income from mines, coal, oil, and gas produced forty-one million dollars; lumber industry eight million, livestock sixty million and crops forty-five million dollars gross. In 1935, it has been

conservatively estimated through the State Highway Traffic Survey that our recreational income from out-of-state sources was twenty-five million dollars from auto tourists alone. In 1936 it passed thirty millions. Remember this has occurred during our years of drouth and depression.

The above figures take into account only the income derived from tourists visiting the state by automobile. There are a great number of out-of-state people visiting our great parks and other points of interest who arrive by rail and a few by air. The income to the dude ranch industry alone amounts to several millions each year, practically all of whose guests came by rail. If we include the tourist income to the state from automobile, rail and air travel, we would find a much larger figure than thirty millions of dollars per annum being spent by outsiders, who have been lured to the state, by its great recreational attractions.

This is the one great resource that may, by careful management and planning, be preserved for all time and be an ever increasing pleasure to our people and a constant increasing source of revenue.

#### Parks

At the present time, we have the two great national parks, Glacier and Yellowstone. We have seventeen million acres of forested areas which are potential recreational areas. Within these national forest boundaries the federal government has had the wisdom to create primitive areas to the extent of 1,750,000 acres. The latter areas are to be preserved solely for recreation purposes; it having been determined by careful study that their value for recreation was greater than for any other use. They are primarily the high inaccessible mountainous areas.

We have two state parks under construction with twelve more areas selected for that purpose when funds are available for the purchase of lands and their operation and maintenance. The legislature, in 1929 authorized the State Forester to act as State Park Director, but provided no funds for any

activity. There should be created a state park board or commission and sufficient funds appropriated so that it may be possible to pursue a more definite state recreational policy. The state should acquire selected areas for state park purposes, either by gift, devise, transfer, grant or purchase before their value becomes too high, even though we are unable to obtain funds at this time for their operation and maintenance.

In June 1936, Congress authorized the National Parks Service, under the Secretary of the Interior, to aid the several states and political subdivisions thereof, in planning and developing adequate public park, parkway and recreational-area facilities for the people of the United States. It was under this authority that CCC camps were set up in Montana to aid in developing our state parks. The state of Montana is expected to contribute some funds for recreational area purposes, to match federal aid, in order to show the good faith and interest of the state in such projects. This is essential in order to obtain continued federal assistance.

We have started, to some extent, the setting aside of certain areas, both by federal and state government for wild fowl refuges and game preserves. We have made an excellent beginning.

#### Development in Eastern Montana

The south central and western portions of the state have been especially favored by nature. We must also plan for the development of recreation areas in the north central and eastern parts of the state so that all our people may enjoy the benefits of out-of-doors recreation and participate in the future income that will be derived from that source. A rather exhaustive study has been carried on in the past year gathering information as to the location of areas which should be primarily valuable for recreation use. (See map showing areas now devoted to recreational use and wild life conservation).

### Historic Values

It is found that immediate steps must be taken to conserve many of our historical points of interest. Many of them have already been lost to us through thoughtless acts and lack of appreciation of their proper value. The beauty of some of our highways running through timbered areas has been destroyed by the removal of timber along its route. Remember that it takes from one to four centuries to produce these great trees. Steps should be taken toward legislation enabling the state or federal government to acquire these strips of forest areas along the highways. In some instances, the larger timber holders have donated, and left the timber standing, following their logging operations. This is however, an unsatisfactory method, to depend upon civic consciousness of private corporations or individuals. Proper legislation should be enacted to provide against desecration of recreational areas and provision made for the establishment and enforcement of regulations for safe-guarding road-side areas from unnecessary despoliation.

### Wild Life

It is very necessary that provision be made, through legislation, enabling the state to acquire water rights in streams needed to preserve fish life. More attention must be given to the proper methods of irrigation in order to prevent the needless loss of fish life by running them onto irrigated lands where they are destroyed.

Careful study is being carried on as to the areas most valuable for the conservation and feeding of our wild game.

Cooperation between all the varied interests using the range together with a spirit of willingness to understand the other fellows needs, will solve any apparent conflict of interest. Certainly with all the great area in Montana there is room for a balanced distribution of game areas throughout the state which will provide for the conservation of our game and

give all our citizens a chance to enjoy the hunting and fishing. Good management of the range will easily provide for the needs of all parties concerned. All out-door persons have a keen interest in our wild life and enjoy having the opportunity to hunt and fish.

We are making advances in the setting aside of certain water areas for the preservation and conservation of our wild fowl, but more is needed if we are going to restore and maintain our fall shooting. Our Fish and Game Commission continues doing excellent work but public support must be given to scientific control of fish and game. Local wants must give way to state-wide needs.

Some land that is most valuable for recreational purposes is included in state school lands. It is necessary that legislation be enacted to reimburse the school funds for lands which should be dedicated to recreation.

Our recreational resources are enjoyed by all throughout our entire life; young and old, rich and poor. It is to the best interest of all of us that we give careful consideration to these resources before they may become irreparably injured or destroyed. At the present time, the income derived from the sale of game licenses is the only revenue available for recreational purposes. The small amount required to be expended for these purposes, at this time, will yield great returns in many ways. Montana must not neglect its opportunities. Our sister states have set us an example which we may well follow with benefit to ourselves and for the generations to come.





